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LONDON, SATURDAY, MARCH 29, 1884.

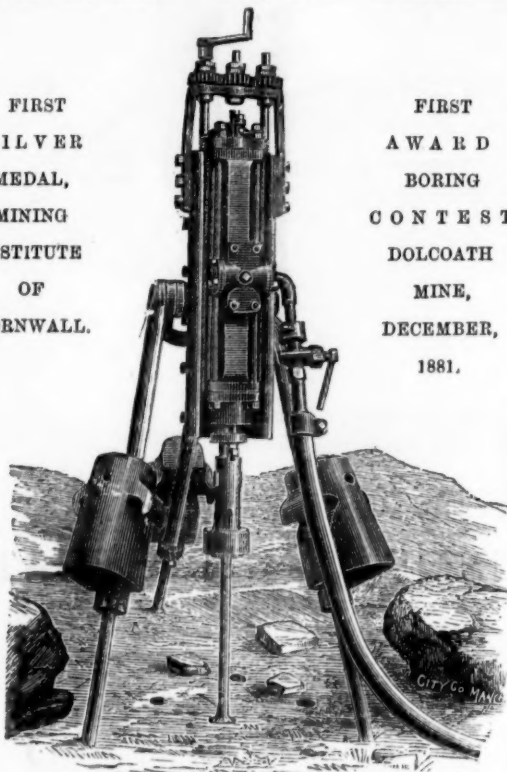
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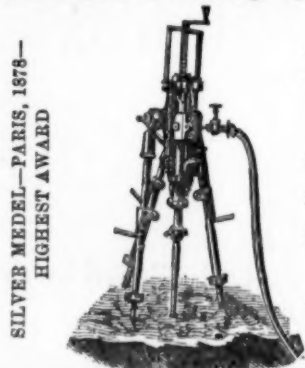
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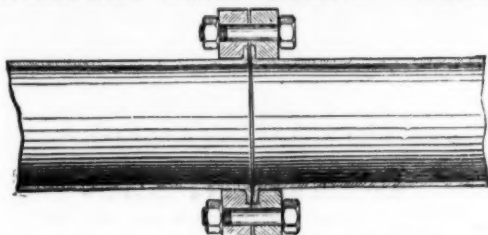
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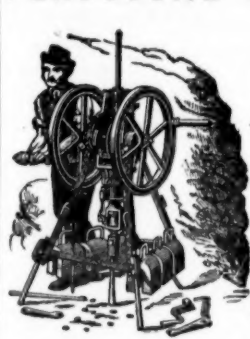


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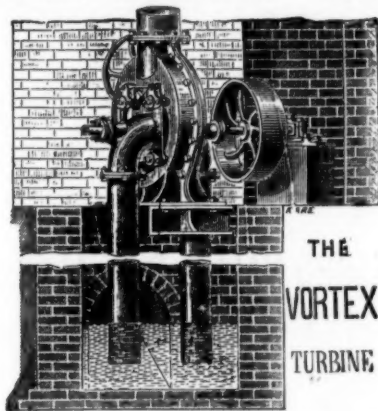
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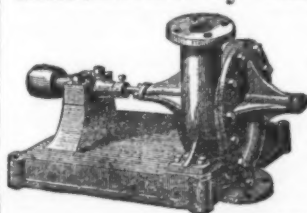
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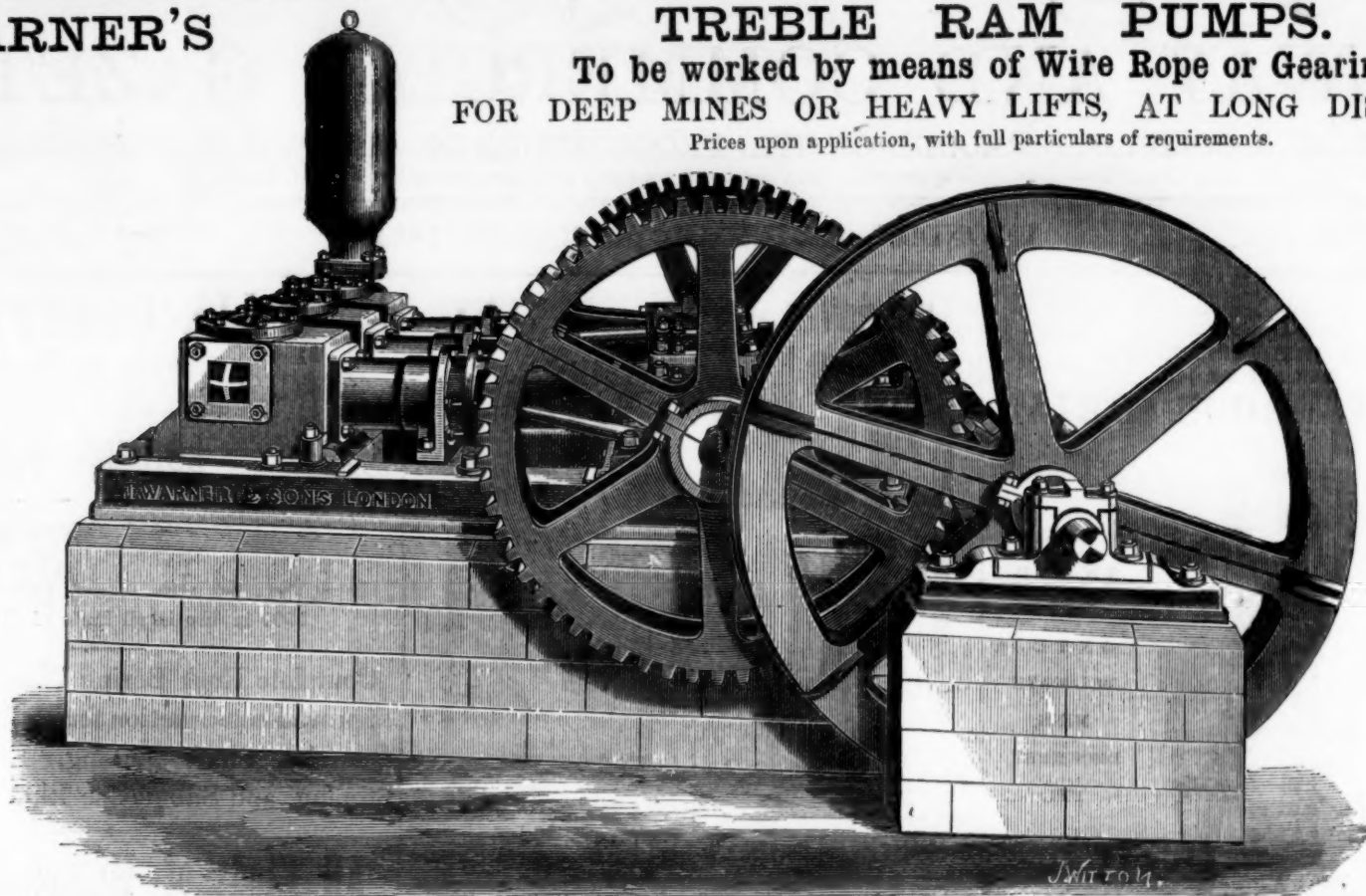
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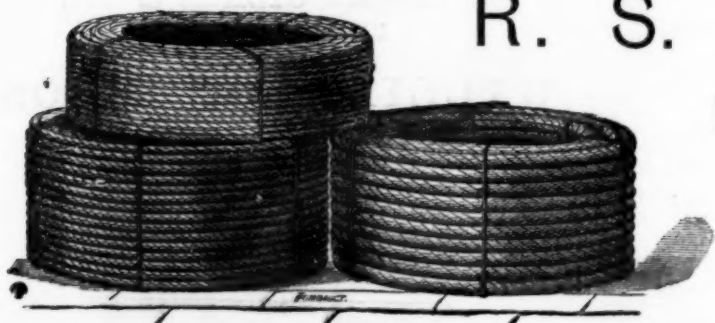
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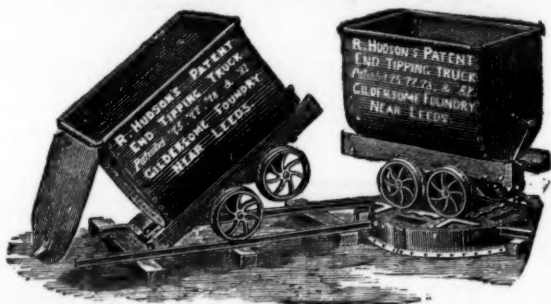
UPWARDS of 25,000 of these Trucks and Wagons have been supplied to the South African Diamond Mines; American, Spanish, Indian, and Welsh Gold, Silver, Copper, and Lead Mines; Indian and Brazilian Railways, and to Railway Contractors, Chemical Works, Brick Works, and Coal and Mineral Shippers, &c., &c., and can be made to lift off the underwork, to let down into the hold of a vessel, and easily replaced. They are also largely used in the Coal and other Mines in this country, and are the **LIGHTEST, STRONGEST**, and most **CAPACIOUS** made, infinitely stronger and lighter than wooden ones, and are all fitted with R. H.'s Patent "Rim" round top of wagons, requiring no rivets, and giving immense strength and rigidity. End and body plates are also joined on R. H.'s patent method, dispensing with angle-irons or corner plates.

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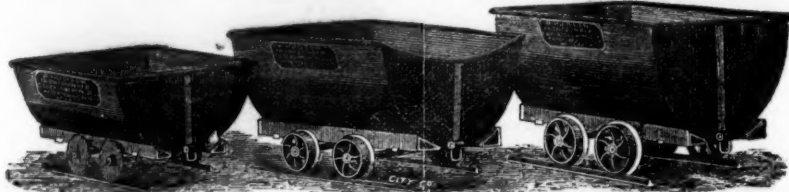
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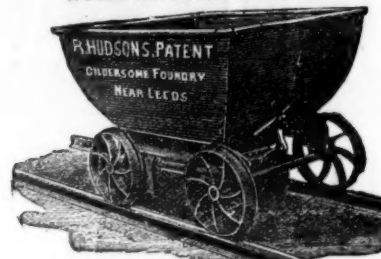
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7.—PATENT STEEL MINING WAGONS.



12.—PATENT STEEL HOPPER WAGON, WITH BOTTOM DOORS.

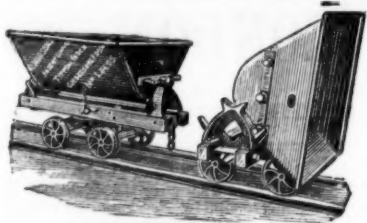


13.—PATENT STEEL HOPPER WAGON.

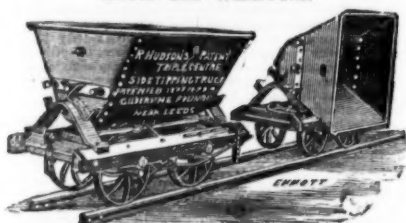


2.—PATENT UNIVERSAL TRIPLE-CENTRE STEEL TIPPING TRUCK.

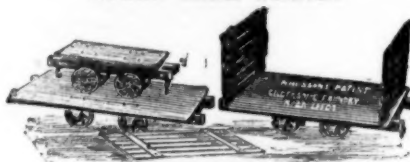
Will tip either side or either end of rails.



3.—PATENT TRIPLE-CENTRE STEEL SIDE TIP WAGONS.



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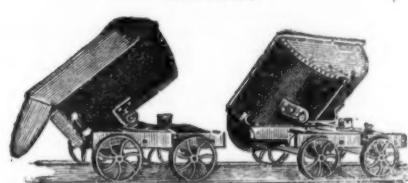


8.—PATENT DOUBLE-CENTRE STEEL SIDE TIP WAGONS.

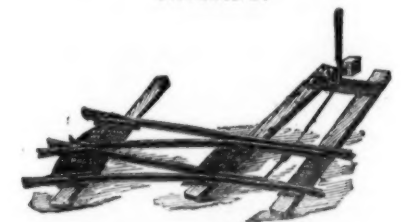
Will tip either side of Wagons.



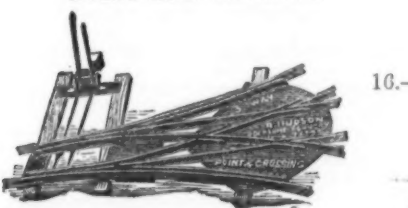
9.—PATENT STEEL ALL-ROUND TIP WAGON.



10.—LEFT-HAND STEEL POINT AND CROSSING.



11.—RIGHT AND LEFT-HAND STEEL POINT AND CROSSING.

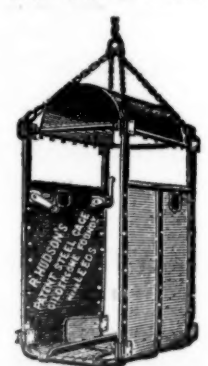


14.—SELF-RIGHTING STEEL TIP BUCKET.

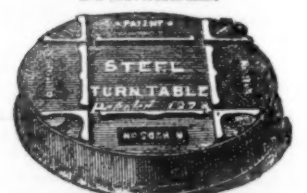
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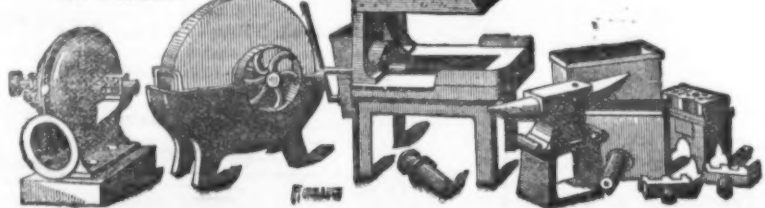
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Original Correspondence.

GUINEA COAST GOLD MINING COMPANY.

SIR,—I am glad to note from "P.'s" letter in last week's *Mining Journal* that he is, like myself, a *bona fide* shareholder in this company, having paid 17. per share for his holding, and I hasten to inform him that I have never been a member of the syndicate he refers to, nor have I in any way derived profit or the slightest benefit from my holding. I have certainly from time to time purchased more shares at the present ridiculously low prices in order to make a good average. I have a friend recently returned from the Gold Coast, who informs me that in almost any part of the Appolonia district, with careful economical management, gold can be found in paying quantities, and I am certainly prepared to wait a few months for results of the present working at Insamankao. At the recent meeting the Chairman asked the shareholders to wait a few months to know the actual backbone of the property, and I may inform "P." that if the results are not satisfactory, say within six months from date, I shall be prepared to join him in any steps that may be considered desirable for the protection of our respective interests.

Manchester, March 24.

R.

GUINEA COAST GOLD MINING COMPANY.

SIR,—Having visited both Izrah and Insamankao, permit me to assure your correspondent "P." that those two properties are not 70 miles apart, as stated in his letter in last week's *Mining Journal*; the actual distance, as the crow flies, between the two places, is under 23 miles.

If "P." will have patience, and take into consideration all the difficulties and delays incidental to the development of a mine on the Gold Coast, he will, in the long run, not have reason to regret his investment. Directors need assistance and encouragement, not constant carping and cavilling at all they do.

Earl's Court, March 24.

W. T.

HEALTH ON THE GOLD COAST.

SIR,—A few remarks respecting the climate of the Gold Coast of Africa might not be without interest to some of your readers, inasmuch as the recent gold mining enterprises in that neighbourhood appear to suffer from a lack of public attention, begotten no doubt of the deadly character usually ascribed to the climate, acting as a bugbear and deterrent to capital; I think it only fair to record the results of my experience bearing on the subject. I will freely admit at the outset, when I left England over three years ago, I shared in the popular belief as to the insalubrity of the West Coast of Africa as a residence for Europeans. After a professional practice, however, of three years' duration in connection with the majority of the gold mines in Eastern Wassau, I have reason to think the disastrous influence of the climate on the health of Europeans has been much overstated. Indeed, a close personal observation of the diseases of that country, as met with in the Tacquah district, during the above-mentioned period, has, on the contrary, convinced me that its climate can compare favourably with that of some parts of India, Central America, Brazil, and a considerable number of the West Indian Islands.

The types of fever usually met with do not belong to the generally serious or fatal classes of malarial fevers, or what under any circumstances can be called malignant or pernicious. Yellow fever is apparently unknown. Decidedly the most frequent form of complaint out there is the so-called "bilious attack," dependent upon a state of engorgement of the liver, which may be brought about by a variety of causes. Notably among these are chills, exposure to the sun, malaria, and too stimulating diet. Associated with such attacks frequently intermittent, and occasionally remittent, fevers are met with, accompanied by their various complications. It is in this direction lies the source of greatest danger. Isolated cases of dysentery occur from time to time among the white population, but these under prompt treatment have usually yielded to the ordinary measures. Liver abscess is seldom, if ever, heard of. The following *resumé* of facts from my medical diary bearing on the health of the mining communities in the Tacquah district of East Wassau will speak for itself:—

1.—EFFUENTA GOLD MINING COMPANY.—During my connection for 14 months with these mines no deaths occurred from illness either among the European or native employees; one death within three hours of a very severe accident to a Kroomboy being the sole instance of mortality during that period. One European was invalided shortly before my arrival at the mines by my predecessor, whose certificate I subsequently confirmed.

2.—THE GOLD COAST MINING COMPANY.—For the past three years only two deaths have been recorded—one of a European member of the staff, who died at some distance from the mines, and who some years previously had sustained a severe injury to his skull, which left permanent visible alterations; the other of a native, who was killed outright by an accident. No European has been invalided from these mines during this space of time.

3.—MESSRS. SWANZY'S MINES—NOW THE WASSAU (GOLD COAST) MINING COMPANY.—At these mines during my official connection of close upon two years two deaths were reported—one of a European of advanced years, who sank from bilious remittent fever; the other, a native, who succumbed to the effects of a gunpowder explosion.

4.—THE TACQUAH GOLD MINES.—While I was attached to these mines, for over nine months, no European died. Two native labourers were lost through pneumonia. One European, well advanced in age, was invalided.

5.—THE FRENCH MINING COMPANIES—LA COMPAGNIE DE LA CÔTE D'OR D'AFRIQUE, ET LA COMPAGNIE DE LA MINE D'OR D'ABOSSO.—These companies have employed my services occasionally, and at one time continuously for a twelvemonth. During the latter period three Europeans died—one from delirium tremens, another very suddenly while bathing in the sea 80 miles from the mines, and the third was murdered in his bed. No mortality among the blacks during said period. Two Europeans were invalided. During other casual attendances two other Europeans died—one, who was moribund when I first saw him, died from effusion on the brain; the other from syncope during convalescence from a bilious remittent attack.

Besides the fatalities enumerated above 10 other deaths have occurred in connection with the French and other mining companies while under the care of other medical men. About a dozen Europeans have also been invalided from time to time. In most of the instances above referred to death could not be ascribed solely to climatic causes, and in some it was altogether independent of such origin. Te anus, delirium tremens, pneumonia, and apoplexy, &c., can scarcely be regarded as purely tropical diseases. Among those in which the influence of climate could be traced the type of the illness in the first instance did not belong to the usually severe or fatal classes. Complications arising from peculiar constitutional states, and in not a few cases from acts of indiscretion were the cause of the untoward result. The element of "funk," no mean factor in determining a fatal issue, was very pronounced in most of the cases brought under my notice, and the more reckless and irregular habits of the individual the more striking was this mental condition in sickness. In respect of the individuals who have been invalided the greater number were from the first ill-fitted constitutionally and badly equipped for a rough life in the tropics. In fact they were such as no insurance office would accept as first-class lives. Others must lay the blame unfortunately to their own follies rather than to the climate.

Situated as the district of Tacquah is in the midst of dense forests, about 800 to 900 ft. above the level of the sea, from which it is distant from 40 to 50 miles, the range of temperature is less than on the coast line. The highest thermometric reading I have observed being 93° Fahr. in the shade, and the lowest 65°, between 5 and 6 o'clock a.m., during the harmattan months. The rainfall throughout the year is very considerable, and the effects of a warm atmosphere highly charged with moisture are to be constantly guarded against. However, when the land is extensively cleared and drained, and

what is more to the purpose placed under cultivation, these dangers will to a great extent disappear, and I am of opinion that the climate will be such as no European of sound constitution and habits of life regulated by a due amount of self-respect need ever fear to live in. I feel assured besides if more care were exercised in the selection of persons better suited physically to adapt themselves to the varying exigencies of bush-life—and there are many instances of a neglect of such care at present—we should hear less of "victims to the climate," and the mining companies could not fail to be benefited by an improved physique on the part of their officials, and by the encouragement which this would afford to the introduction into the country of intelligence and practical ability of the proper sort.

WM. BOURKE, M.B., M.C. Edin., M.R.C.S. Eng.

City Club, March 24.

A DISCURSIVE VIEW IN THE INTEREST OF MINING—No. IX.

SIR,—The anomalies of modern mining constitute a theme which passes ordinary comprehension, whether considered in respect of its objective or subjective relations—divisions which comprehend and include its industrial, commercial, and wealth-producing aspects, the latter comprising its primary and final objects—pecuniary results, and their originating channels. From this succinct view a variety of considerations present themselves. The subjective relations of this great industry—paramount and indispensable to the progress and advancement of every other art and industry—is wholly arbitrary, and, consequently, not easily defined. The extreme limit of its subjective side is subjugation, and that has been accomplished and improved, to purposes inimical to its best interests—that is to say, to its proper development and fullest success. If it had not gone astray—or rather had not been forced into unnatural and highly reprehensible relationships and channels—it would have long since been regarded not only as the leading original wealth-producing industry, but the most popular and profitable field of enterprise for the employment and augmentation of capital. As a wealth-producing industry it is not only unrivalled but unequalled, whilst the profits derivable from its proper prosecution are commensurable with the abounding fertility of its almost limitless sources. No country ever has or ever can become great in the recognised and accepted sense of that term that has not its developed mines yielding the precious or other metals and minerals of commerce; but all this is as well known generally as I can state it. But what I am desirous of showing is that mining *per se*—that is divested of all extraneous encumbrances and appendages would be as simple as simplicity itself; but it has been forced to become the playground of arrant and unscrupulous speculators, whereby nothing in many respects is regarded but its name, and that prostituted to ulterior purposes, with callous indifference to the merit or otherwise of the legitimately primal objects—the ostensible sources of the wealth objectively which should be the all-absorbing, inspiring, and governing incentives. It is due in a large measure to the subjective abuse of mining that its practical conduct—misconduct—has been in so many instances prolific only of deplorable results. If an original wealth-producing enterprise is to be made the substitute of artifice for another or other enterprises non-producing and inferior in purpose, but popular because more immediately speculative and exciting from the nearness of its view, and the conformability of its *regime* to the fancies, vagaries, and caprices of arrogantly arbitrary intellects, pliable tools, rather than stern practically experienced superintendents will be the chosen and authoritatively invested executive officials, for the purpose, it is presumed, the more effectually to consummate the nefarious designs, and render symmetrical the abnormal fabric from bottom to top. But this is not all. All men, even appreciably good men, are not compounded of elementary constituents capable of resisting mercilessly adverse strains, but are susceptible of and influenced by motives of policy, dictated by the nature and circumstance of their surrounding "to be, or not to be," is to dependent ambitious men, in view of livelihood and position, a serious question to be what they would not, or not to be what they would, is a hideous and embarrassing alternative, involving a sacrifice of principle, or what is next to it social, and it may be pecuniary, advancement, and hence it is that the faculty to "please well" is an accomplishment more highly appreciated and more liberally remunerated than the most unquestionable qualifications commended by the most assiduous endeavours to "serve well," and, hence, also, it is that tactics for progress other than those of mining on the merits become an embodiment in sundry schemes, garnished with the fripperies of imagery, fancifully conceived, to the manifest injury of mining—its unpopularity as an enterprise and degradation as a pursuit. That this view is pessimistic is due to the subjective faculty of reason as exercised with the stubborn reality of facts. The objectionable features are arbitrary innovations, and not a natural outgrowth of the system's development; are not even a temporary necessity of its being or well being engrafted excrescences, ulterior in objects, and demoralising in their effects.—*Ione, Nye County, Nevada, March 2.* ROBT. KNAPP.

WYNAAD PERSEVERANCE COMPANY.

SIR,—I have been waiting to see whether the directors of the Wynaad Perseverance Company would have the courage to send to the shareholders a verbatim report of the proceedings of the extraordinary general meeting held on March 14. Ten days have now elapsed, and still the shareholders who were absent are kept in utter ignorance of what took place. I, therefore, with your permission, would ask them to read the (necessarily) condensed report in the *Mining Journal* of March 15, by which they will see that the shareholders decided to allow the directors to speculate with the remaining funds of the company, which are nominally equal to (say) 24 per cent. of the original capital, or 4 per cent. of subscribed capital, in the vain hope of ultimately getting a dividend—a forcible illustration of drowning men catching at straw, or even at "reha grass!" The course adopted at the meeting is diametrically opposed to the recommendation of the Committee of Investigation, of which I was a member; but a few months probably will decide who was right, and I am quite content to wait events.

Shareholders, as usual, appear to have entrusted their proxies to the directors with blind confidence; but if they had but taken the trouble to have investigated the past history of the company, by simply referring to the directors' reports of 1881, 1882, and 1883, they would have been able to judge of the value of the board's predictions and promises (apart from the question of the yield of gold), and would have more thoroughly appreciated the committee's report.

Extracts from report of Oct. 26, 1881:—"They think this is a good opportunity for informing the shareholders of the exact state of affairs with regard to the position of the company, which, in their opinion, is favourable, and they themselves have every confidence in its success. Available cash in hand invested—24,500*l.*, out of the 30,000*l.* remaining over after paying the vendors the purchase-money (50,000*l.*) in cash and shares. Coffee—150 acres now planted; this year's crop, owing to deficiency of rain, will not be good; trees are capable, in a good season, of producing about a 40 ton crop, which would leave a good margin for profit. Cinchonas: To date 89,000 succirubra and 950 cal. ledgeriana have been planted out permanently, and next season another 20,000 or 30,000 succirubras will be planted from the nurseries. These trees will, in the course of four or five years, produce a large income—say, at the rate of 1 lb. of bark per tree, at 2s. per lb., on about 100,000 trees, 10,000*l.* per annum." Extracts, report of Nov. 30, 1882:—"Coffee: The recurrence of three bad seasons for the cultivation of coffee caused serious anxiety to the directors. The losses from coffee (163*l.* 19s. 2d.), as shown in the present balance-sheet, have practically added considerably to the cost of the cinchona plantation, which, the directors anticipate, will prove a very valuable property." "Cinchona: There are now 91,000 trees planted out on the estate."

In July, 1883, the directors laid before the shareholders reports from Mr. G. O'Brien and Mr. Thomas Stanes on the mining and cultivation respectively, and, at the same time submitted a proposition to the shareholders for acquiring the Mammoth estate; but this was ultimately rejected, on the recommendation of the committee to which it was referred.

Mr. O'Brien's report was most discouraging, and gold mining was abandoned.

Mr. Stanes reported on the coffee and cinchona as under:—"Coffee: No. 1 field, on the north-west side, has, to all intents and purposes, been abandoned. The cinchonas planted in this field between the old coffee trees are doing fairly well. No. 2 field, on opposite side of the ridge, is decidedly better in appearance; but the whole field, with the exception of about 40 acres, had the appearance of neglect and want of cultivation. About 40 or 50 acres of the coffee in this field is looking decidedly well, and has a fair show of crop on it—I should estimate about 6 tons; but it sadly needs handling and weeding. Cinchona: There are about 60,000 succirubra, growing well and looking healthy. The cinchona ledgeriana are looking remarkably well. . . . There are about 950 of these plants, according to the account given me by the manager."

The directors mention that though the cinchona plantation is reduced to 60,000 trees, will, with moderate and inexpensive yearly additions, be yearly increased in value, and may be expected to yield in 1886 a gross return of 90,000 lbs. weight—say, at a medium price of 1s. 6d per lb., 6750*l.* In the report (Dec. 16, 1883) there is not a word about coffee or cinchona, but the accounts show a loss on cultivation of coffee to May, 1883, of 1798*l.* 11s. 4d., and the directors say that "barely one-tenth of the 30,000*l.* working capital now remains." From the above extracts unbiassed persons can judge whether the directors are likely to pull the company through its difficulties. The 10,000*l.* per annum held forth in October, 1881, as the probable income in four or five years from cinchona alone, it will be observed, had dropped in July, 1883, to 6750*l.*, and was only bolstered up to that sum by assuming a yield of bark 50 per cent. in excess of that estimated in 1881. The 40 ton crop of coffee shadowed forth in 1881, was estimated in 1883 as 6 tons, and even this quantity has not been realised. Since the latter date, as I have already said, no mention has been made of either cinchona or coffee; but we are told that something fabulous is to be made out of the indigenous weeds of the country, and upon this the directors have staked their reputation and the remaining funds of the company.

I subscribe my name in full, and I trust anyone who may dispute my facts or figures will do the same.

London, March 25.

C. STEPHENSON.

COPPER ORE STANDARD.

SIR,—I have to thank your correspondent, Mr. John Roberts, M.E., for his reply to my letter of the 8th on the above subject; but I am sorry that he has not followed out his examples in the full, after giving the basis on which the calculations are made for ascertaining the standard of different produces, and the rule upon which any other standard can be obtained. He gives us two examples based upon the sale Feb. 27, 1883. See his letter. What is the standard of 6 per cent. produce on the bases referred to above? According to his letter 83*l.* 6s. 4d. is the amount which governs all produces otherwise than 9 per cent. Thus, 83*l.* 6s. 4d. divided by 6 per cent. = 13*l.* 17s. 8d., plus the standard for 9 per cent. gives the answer 95*l.* 15s., which amount shows a value of 3*l.* 6s. 10d. for 6 per cent. produce ores. I should like to know how it sh. was a value of 3*l.* 5s. 10d. for 6 per cent. produce? He also states that the standard is the price of the fine copper in the ore plus the returning charges. This being the case, if I take the price given for the fine copper in the ore at the sale referred to above, and add to it the returning charges, 45s. per ton, upon 11 1-9th tons of ore, this being the number of tons of ore of 9 per cent. produce required to make 1 ton of fine copper, I should leave the standard of 9 per cent. thus—55*l.* 19s. 11d., the value of fine copper in the ore at the said sale, plus 24*l.* 10s., the returning charges on 11 1-9th tons of ore, equals 80*l.* 9s. 11d. as the standard for 9 per cent. produce, instead of 81*l.* 17s. 4d., given in your valuable *Journal* as the average standard of 9 per cent. produce of the said sale. I trust it will not be troubling your correspondent too much to try and make these points clear, and that he will also note that he gives not the least clue how to get at the standard for 9 per cent. produce when the produce of the sale is above or below that figure.—*Morrison, March 24.* C. W. J.

YEOLAND CONSOLS MINING COMPANY.

SIR,—You inserted for me in the *Mining Journal* of Feb. 9 some comments upon the affairs of the above company, in which I am personally interested. Since then I have received evidence of a nature so conclusive that the property of the real investors is being rapidly made away with that I would beg you to allow me space for a few additional remarks upon the subject. No *bona fide* shareholder could inspect the pretence of work made at the mine during the last two years, with an old portable engine and by the employment of a few hands for a week or two before the annual meeting of the company, without the conviction that for all prospect of his ever receiving any return for his invested money he might as well have thrown the latter overboard at sea. He could see at a glance the real value of the directors' professed intentions of applying water-power—in one year by carrying it in the usual manner in a shoot across the hollow, in the next by means of a visionary system of pipes; he could see what a mere fraction of their outlay has from the commencement been devoted to useful mine work at all, and what an insignificant asset the removable plant will form should a wind-up take place and the mortgagees appear upon the scene. The credulity of the latter having been exhausted the directors now revert to the shareholders, hoping to induce them to pay further calls, and it was doubtless in order to facilitate response thereto that the valuable report of what is again "going to be done" at the works was sent for insertion in your intelligence columns of March 15.

It may be instructive to the liquidator to note how far these high-minded intentions have been acted up to by the date of the wind up; their professed object—the working of the mine—such as it is, would have been attained more than a year ago had the shareholders' money been more judiciously expended. The whole benefit of such fixed works as have been executed will pass not to the real investors but to the promoters and others, including perhaps the receiver in bankruptcy, representing one who still holds shares, and was present at the last meeting of the company.

Of course, part of the scheme for maintaining the credit of many concerns is the sending weekly for publication an imaginary share quotation, designed to excite belief that the stock is marketable, or even carrying a premium. Judging from my own fruitless attempts, and from what is recorded at Somerset House, it is certain that no *bona fide* investor in this undertaking has ever been able by disposal of his shares, at whatever sacrifice, to sever his connection with the concern.—*Junior United Service Club, March 22.* J. U. S.

LEAD AND BLENDE MINING IN THE LAKE DISTRICT.

SIR,—In again asking you for a small space in your valuable *Journal* I must depart somewhat from my usual custom, and instead of giving notes on the various mines in this district I will confine my remarks on this occasion to one mine.

A very important event in the annals of lead mining in the Lake district took place on Saturday last—the starting of the new pumping-engine at the celebrated Brandley Mines, near Keswick. It was not generally known in the neighbourhood which day the formal opening was to take place, or in all probability the influx of visitors to the mine would have inconvenienced the officials. However, I got the "tip" that Saturday was the day fixed, and accordingly I wended my way to the mines. I was rather late to see the opening ceremony, and on my arrival found the machinery in full work and a torrent of water being discharged from the pumps. I could not help noticing that the whole of the machinery and erections are of the best possible kind, and reflect great credit on all concerned. From the fragments of a broken bottle laying by the pumping beam I gathered that the time-honoured ceremony of "christening the engine" by breaking on it a bottle of wine had been performed, this duty having been fittingly undertaken by the Chairman of the company—Mr. Crank, of Liverpool—who afterwards presided at a banquet given to the workmen in one of the newly-erected buildings on the mine.

About 100 sat down to partake of the feast, including the directors, engineers, and workmen. A very enjoyable afternoon was

passed, and masters and men appeared thoroughly to enjoy themselves. Numerous toasts were the order of the day, and these were received uproariously by the guests. The toast of the day was naturally "Success to the Brandy Mining Company," and on this head the directors could not fail to be satisfied, as all the old workmen are unanimous in their statements that in the bottom of the mine there is untold wealth. I need not again trouble you with my testimony on this, as a short time will now prove by actual survey that the Brandy Mine has a rich body of ore to work on, such as is not often seen in the richest of our mines. In furnishing these particulars I would observe that I did not take official notes of the different speeches and statements made at the meeting, but merely looked on from an unobserved position. I am, therefore, unable to do justice to the spokesmen, but all appeared to be in the best of spirits, and one member of the board gave vent to his feelings in a poetical outburst, composed, I am informed, specially for the occasion. I was delighted to see a large heap of very fine lead lying on the surface, obtained from the Salt Level. My mine might envy such a heap of ore; but said an old miner to me when I was looking at it, "The vein in the 50 is ten times as good as that." As the mine will now be rapidly drained I hope soon to have the pleasure of troubling you with details as to lodes exposed to view, and these, I am sure, will be of such magnitude as to warrant the assertion I have before made that the Brandy is one of the best lead properties in the North of England. Some of the other mines in the neighbourhood have improved; notably the Threlkeld Mines and the Barrow Mines, but I will refer to these in my next article. SKIDDAW.

March 27.

POLBERRO MINE (ST. AGNES).

SIR.—Permit me to say that it is quite true that the rich Pink lode discovered in the Trevaunance Mine passes through the entire length of Polberro; and further, that Penhalls levels on this rich lode have been driven close up to Polberro boundary, leaving no doubt of its value to the Polberro Company. JOHN B. REYNOLDS.

London, March 28.

GREEN HURTH MINING COMPANY.—The annual meeting of the shareholders of this company was held on Tuesday at the offices, Westgate-road, Newcastle—Mr. J. C. Swan presided. The balance-sheet and reports were adopted. The Chairman said that during the past year they had been able not only to maintain their dividends but also to somewhat improve their financial position, and to carry over a larger balance than they did in the previous year. They had during the year raised, roughly speaking, 100 tons of lead more than in the previous year. The cost of raising the lead had been £904, less—in fact, they had made a reduction in the cost of production per ton. They had discovered No. 1 vein going north, which promised to be very rich, and they had also begun to open out a drift going towards the old workings. In reply to questions, the Chairman said that at the end of 1882 406l. 11s. 6d. was carried forward, which, with 5263l. 6s. 7d., made at the end of 1883 an available balance of profit of 5669l. 18s. 1d. The capital was only 1920l., and for certain repairs, renewals, and improvements they had drawn upon the revenue. They had divided 4800l. in dividends during the year. Efforts were being made to obtain a reduction of the royalty. Messrs. T. Sheldon, T. B. Barker, and Lieut.-Col. Monks be re-elected directors. It was resolved that in future the directors should be paid 200 guineas per annum for their services. The meeting closed with a vote of thanks to the Chairman.

MINERAL RESOURCES OF THE UNITED STATES.—We were enabled some time since to give from the advance sheets a summary of the statistical report upon the present condition of the Mining Industries of the United States, transmitted June, 1883, to the Hon. J. W. Powell, the Director of the Geological Survey, by Mr. Albert Williams, jun., the chief of the division of Mining Statistics and Technology. The volume has now been issued and is obtainable, as well as all other publications of the Survey. Amongst the acknowledgments we note that Mr. Charles Kirchhoff, jun., editor of the New York Engineering and Mining Journal, who has had special charge of the statistics of copper, lead, and zinc; Mr. C. G. Yale, editor of the San Francisco Mining and Scientific Press, who was placed in charge of the Pacific Division; and Mr. F. F. Chisholm, of Denver, who collected data for the Rocky Mountain region, and who has contributed valuable correspondence to the *Mining Journal*, are specially referred to as having been indefatigable assistants. The article on the Useful Minerals of the United States, by Mr. J. C. Smock, is one of the most elaborate and interesting tabulated statements yet published, and will be very generally referred to.

FOREIGN MINING AND METALLURGY.

Prices have been still tending downwards in the French Iron Trade, and a quotation of 6l. per ton for iron is now generally admitted at Paris. As a consequence of this state of things the forges and blast-furnaces in the North and East of France have decided to make as large reductions as possible in their production. The condition of the German iron trade is still not very brilliant, and it is announced that one establishment in Silesia has made a fresh reduction in bars. The production of rails in the Austro-Hungarian Empire in 1883 is officially returned at 246,650 tons, as compared with 328,005 tons in 1882, showing a falling off of 81,355 tons last year. Plates were made to the extent of 181,020 tons in 1883, as compared with 167,886 tons in 1882, showing an increase of 13,134 tons last year. Contracts have just been let in Italy for 18,000 tons of Bessemer steel rails. Messrs. Bolckow, Vaughan, and Co. (Limited) delivered the lowest tender for one lot of 5000 tons, which they undertook to supply at 5l. 15s. 2d. per ton, delivered at Genoa. The Union of Dortmund took another lot of 5400 tons at 5l. 14s. 7d. per ton, while Bochum contracted for 5080 tons at 5l. 14s. 9d. per ton. It appears that at the close of 1883 contracts for 37 locomotives, required for Italian railways, were in course of execution at Italian works. Italian industries are also now engaged upon a large number of carriages and trucks to meet the growth of Italian railway traffic.

The improvement recently noticed in the Belgian Iron Trade has been maintained, but it cannot be said that it has made any further progress. The general state of affairs shows some improvement as compared with the condition of business at the close of February; but it has not changed materially during the past week. Orders have come to hand, and it is, of course, a subject of congratulation to see most of the works more or less well employed. At the same time the blast-furnaces have experienced some difficulty in disposing of their production at Charleroi, and it is proposed accordingly to reduce the number of furnaces in blast. The forges have some orders in course of execution, but they are still not fully employed; the construction workshops are also complaining of inactivity. The steelworks are pretty well employed. In addition to an order for 12,500 tons of steel rails which it has obtained in the Argentine Republic, the John Cockerill Company has secured an order for 300 tons from the Upper Italy Railway Company. Speaking generally, quotations have been maintained without much difficulty; English casting pig has been held with a little more firmness at 2l. 1s. to 2l. 1s. 6d. per ton. No. 1 has remained at 4l. 16s. per ton, while No. 2 has been weak at 5l. 2s. per ton; No. 3 being quoted as hitherto at 5l. 8s. per ton. Ordinary girders have made 5l. per ton. Plates have remained at their former level—No. 2 at 6l. 6s. per ton; No. 3 at 7l. 2s. per ton; plates of commerce at 8l. 14s. per ton; and No. 4 at 10l. 6s. per ton.

The condition of the Belgian Coal Trade appears to have become rather more favourable upon the whole. Firmness has become the order of the day, and stocks are being reduced both at Mons and at Charleroi. This appears to have been the result of a strike in the Anzin district, which has exerted a sensible influence upon the Belgian markets. In the Borinage the stocks held have entirely disappeared in consequence of the considerable and regular movement of coal to France. The Trieu-Kaisin and Amerceur Collieries have been dispatching of late nearly 60 trucks of coal daily, and, of course, such deliveries as these have not been without their effect

upon stocks. Quotations have not varied materially upon the Belgian markets notwithstanding the close approach of April. Coke has been held at about 10s. 6d. per ton. In the week ending March 16, the number of trucks carrying coal and coke which passed over the Belgian State Railways was 18,153, as compared with 18,799 in the corresponding week of 1883. The tone of the German coal trade has been rather weak, although business has been done of late at previous rates. More and more considerable quantities of coal have been forwarded from the ports of the Rhine to Holland and Belgium. The Grand Mambourg-Sablottière Collieries Company (Belgium) realised last year a profit of 12,726l. Of this sum 9600l. was applied to the payment of dividend at the rate of 16s. per share.

COAL IN INDIA—THE SINGARENI COAL FIELD.—No. II.

BY WILLIAM KING, B.A., D.Sc.,
Deputy-Superintendent Geological Survey of India.*

The borings were subsequently carried out by Mr. Heenan, the mining engineer of the Nizam's Department of Public Works, and I had the good fortune to visit the place once more while he was at work. On this occasion the bore-holes indicated that there are other seams besides the one I had found. As to ascertaining the quantity of coal likely to be got out of a field like this the calculation is beset on all sides by such pit-falls as failure in continuity of the seams, doubts as to whether the seams are always the same, and variability not only in the thickness of the seams but in their composition. Further in our examination of the lower Gondwana formation as it extends down the Godavari Valley, from the Central Provinces, a tendency is observable in the Barakars to hold less and less coal, as though they were thinning out or dying away to the southward. Hence the chances are that an outlying pocket of the lower Gondwanas, such as this little area is, might only hold fitful and capricious seams. On the other hand, it is possible enough for such a pocket to be a rich one, and I am bound to state that such appears to be the condition of things here. Be this as it may Mr. Heenan completed his explorations, and in 1875 he prepared a *resumé* on Coal in H. H. the Nizam's Dominions, in which, among the accounts of other fields, he gives an extremely encouraging sketch of the capabilities of Singareni. To this *resumé* I am indebted for the data and calculations selected, which I shall take the liberty of discussing *seriatim* as closely as possible by the light of my knowledge of the behaviour of the Damuda formation and its groups in the Godavari Valley.

For convenience of work and other causes Mr. Heenan examined the field in two parts—a northern one, in which the outcrop occurs, and a southern one. He put the bore-holes down in the first portion over an area of 1½ square mile, outside of which there is still a good deal of Barakars, and in the southern part he bored over about 1½ square mile, leaving a similar selve of sandstones all round. In the northern half of the field there are four seams of coal, the uppermost having an average thickness of 6 ft., the next two an average thickness of 3 ft. each, and the bottom one (at 151 ft. below the surface) being sometimes 34 ft. thick. The bore-holes appear to have each pierced the four seams, so that the calculated area is the same for each. Indeed Mr. Heenan specialises the bottom seam as having this area, though he does not venture to estimate its average thickness very closely, as it is an uneven lenticular bed thinning out rapidly at the edges. In the southern portion the four seams are still extant, but they vary in thickness and depth. Mr. Heenan says of the capabilities of the seams—"The upper, or King's, seam extends over an area of 1½ square mile on an average thickness of 6 ft. throughout, and allowing one-third for pillars, &c., there will be 5,500,000 tons of workable coal." This tonnage is calculated as follows:—A cubic yard of coal being equal to 1 ton weight, 1½ square mile gives 4,646,400 tons. The seam is 6 ft. thick, which will give double the number of cubic yards, or 9,292,800 tons. It is usual in coal mining to leave about one-third of the coal in the form of pillars or blocks for the support of the roof, which amount being subtracted from the above tonnage leaves 6,195,200 tons, rather over Mr. Heenan's estimate. There is always an enormous deal of waste in working coal, especially with Indian coal, while there is sure to be a lot of poor shaly stuff which will not come up to the requirements of railway fuel. I would, therefore, subject the amount given above to a further reduction of one-third, when the result would be 4,130,134 tons, or (say) 4,000,000 tons of workable coal. Mr. Heenan next says:—"The second and third seams extend over a like area, on an average thickness of 3 ft. each throughout, and will produce 8,500,000 tons of workable coal." There is some mistake here; the aggregate thickness of the two seams is only 6 ft., and the area is the same as in the upper seam, hence the probable out-turn must be the same, or 4,000,000 tons. I will not enter into Mr. Heenan's account of the bottom seam; he clearly had not obtained sufficient data for a fair estimate at the time of publishing his *resumé*. He estimates, however, that there may be 8,500,000 tons, which I very much fear will be found above the true quantity. Whatever it be I refrain from making any guess about it. Suffice it to say that the seam is sometimes very thick, and it may give such thickness of good coal in the area defined by the bore-holes as to keep the total tonnage of the northern part of the field well above 8,000,000 or 9,000,000 tons. In the southern area the lower seam thickens out to over 50 ft. in some places, but the quality of the coal is said to be variable. The three other seams are slightly reduced along the western edge of the field. The area is somewhat larger, and Mr. Heenan calculates on a corresponding increase in the probable out-turn, which I would, however, reduce to about the same amount as in the northern field. On the whole, the possible out-turn of good coal may be reasonably reckoned as 16,000,000 or 17,000,000 tons for the whole field, which is indeed vastly larger than I ever expected for so small an area. I am bound to be as cautious as possible in a calculation of this kind, but I must at the same time give due credit to Mr. Heenan's stated facts concerning the thicknesses and areas as shown by his boring explorations. All that we feel justified in doing is to weigh his opinions on the quality of the coal in the seams and the likelihood of their being so permanent in their thickness as he seems to think they are, and I think the reductions I have made on his total estimate of 46,500,000 tons will meet the contingencies likely to be encountered.

The quality of the coal is the next point of interest. That which I myself obtained at the out-crop was tolerably light and compact, not shaly, but charged slightly with patches of powdery charcoal, breaking into big lumps, and having the bright lustre of ordinary coal. After it had been dried in the sun it soon made a great blazing fire in front of my tent, which was kept up all night by the people as being something new in that country. The next morning all that remained was a heap of powdered ashes and some fragments of harder cinder, which were easily knocked into powder. An analysis made at the Survey laboratory in Calcutta gave:—Fixed carbon, 62.4; volatile matter (moisture, 6), 22.6; ash, 15.0=100.0. This shows a very fair style of Indian coal; the 15 per cent. of ash is, however, just within the limit of coal having a ready sale in India, while the proportion of fixed carbon is much higher than that of average Raniganj coal. The moisture is lower than is usual with Godavari coal. Subsequently the coal underwent more practical tests. A shaft was run down 200 ft. away from the out-crop to 60 feet, which reached the bottom of the uppermost seam. About 300 tons were extracted and sent to Hyderabad, where it was found to work very satisfactorily both in the stationary engine and at the workshop forges. On the Madras Railway about three years ago experiments showed that the coal is very hard, makes little dust, and leaves very little ash in the smoke-box; there was no difficulty in making steam with it, but it was found to make a great deal of ashes in the ash-pan, for which of course special arrangements can be made.

The great point about these experiments is that the coal was not thrown aside as being of no account. Mr. Trevethick, in his report, calls it a good serviceable fuel, and says "that if the facilities for carriage are such as will admit of its being delivered to consumers at a reasonable rate it should be well working." The coal of the upper seam has only been practically tested, but by all accounts

that of the other seams will be found to be of similar quality. Mr. Heenan gives the following analysis of coal from the lower seam, in which the percentage of ash is remarkably low:—Fixed carbon, 66.00; volatile matter, 23.00; ash, 11.00=100.00. In considering now the means of getting this coal to Madras, or indeed having it transported anywhere, the depth at which it lies, the nature of the locality, and the means of approach are matters of great importance. The lowest seam is only 150 ft. from the surface in the northern part of the field, and it never runs beyond 250 ft., so that the pit shaft or shafts will not involve any extraordinary sinking. Then there will be no great demand on pumping apparatus; the locality is a dry one, being in a very small drainage basin of about 37 square miles, at the head of one of the minor feeders of the Munier tributary of the Kistna river. The situation, as I have already said, is favourable, owing to its being in the low country, and thus easily accessible from the wide open plains of Kammummet. It is of course a jungly region of secondary forest, but this will be of advantage in supplying timber for the works and railway. So convenient is this field in every way that I used to dream of it thus:—If the Nizam's Government do ever carry out a system of railways as was then proposed between Hyderabad, Chanda, and the Kistna frontier *via* Hanimkonda, why should not a Zemindar—say, a European—of Singareni import his mining plant *via* Coconada and the Godavari, sink his pit, lay down a tramway from the colliery to Kammummet, and supply the railway at Rs. 5 a ton? I really think still that this might be done at a profit.

This brings me easily to the problem how to get the coal out of the place, and lay it down at Madras at a fair rate. In the Government enquiry or correspondence of 1879 on the capabilities of the Singareni and Godavari coal; Mr. Trevethick stated that the cost of the Godavari coal should not exceed Rs. 15-4 per ton, stacked in the Royapuram yard, to attain the same result as is got by using patent fuel at Rs. 22-11-9 per ton. I very much fear that since then the price of patent fuel has gone down somewhat; in which case Singareni must yield its fuel at even a lower price than Rs. 15-4. The first point is as to what the price may be at the pit's mouth. The coal already mentioned as having been sent down to Madras cost Rs. 8-8-2 per ton at the mouth of shaft. Of course, the shaft is only a temporary affair with no appliances in the way of machinery, and the coal was got out in the most primitive manner at a price very considerably above what could be done at proper colliery works. Coal is sold at pit-mouth in Raniganj and other places on that side of the country sometimes for so low a price as Rs. 2-8 or Rs. 3 per ton. At Warora, in the Central provinces, coal is sold to the public at Rs. 7-8 per ton unscreened; screenings or small coal at Rs. 4; the price to guaranteed or State railways being lower.

Coal is carried in Bengal and Central India by rail at about Rs. 2-5 per ton for 100 miles. The Madras Railway rate is much higher than this, and the Nizam's State Railway carries it for about Rs. 3-2. However, perhaps both railways will carry it at a lower rate when they have to carry it in any quantity. Not to pare things down too finely let the 3-2 rate be taken, and this will raise the price of coal at Bezwada to Rs. 8-8. There is then the water carriage for 274 miles by canal. Referring again to the Government correspondence of 1880, it appears that with proper boats and an organised system of transport the rate should not exceed 2 pies per ton mile, which will make the charge Rs. 2-13-8 per ton for the canal route, or Rs. 11-5-8 as the price of the coal at Madras. A further slight charge must be added for carrying and stacking at Royapuram yard, which certainly will not run the price beyond Rs. 11-8 a ton, well within the Rs. 15-4 laid down by Mr. Trevethick. It must not be forgotten that Rs. 6 is the proposed prime cost in this calculation, not Rs. 5 as I would have it. The present normal annual consumption of coal on the Madras Railway is only somewhere about 12,000 tons, equivalent to 16,000 tons of Singareni coal; hence, if there were only this railway to feed and its fuel reserves held out at their present rate, the Singareni field might be expected to last for over 1000 years. The fuel reserves are uncertain, the Madras Railway Company may require more coal, the South of India Railway is ready to take a very large amount, the eastern system of Nizam's railways will require fuel, and altogether it is not improbable that this annual demand for coal might run up to 50,000 tons in a very short time. With such a drain this field might hold out for 350 years; perhaps under certain views quite long enough for us in India. On any view, if a greater demand arise, there are the other fields to fall back on.

I hope I have now shown that Singareni is the immediate field for opening up, that 17,000,000 tons of coal may be reasonably expected to be got out of it (if not the 46,500,000 tons of Mr. Heenan's estimate), and that a railway between it and Bezwada will help to land coal in Madras at Rs. 11-8 per ton. The other fields in the neighbourhood are Sivawaram and Madaveram. They with the so far unfruitful field of Bezzadanol are patches of Barakars, situated on different sides of a large area of Kanthi strata, which may be called the Ashwarapett region. This area of Kanthi is about 240 square miles in extent, and it lies alongside the zig-zag portion of the Godavari, between Bhadrachellum and the gorge of the river. Thence it stretches down towards the Ellore and Yernagudem part of the Godavari District.

Sivawaram and Madaveram are situated at the north-east angle of this area, on or close to the bank of the river; they both contain seams of coal of greater or lesser importance. Away on the western edge of the area, near Chundragunda and Kunigiri, there is another patch of Barakars, which has not, however, given any signs of coal as yet. The probability is very strong that between this and Sivawaram there may be a continuous and thus extensive field of the same rocks underlying the Kanthi. This part of the country is entirely in the Hyderabad territory, and Mr. Heenan made a few bore-holes in the neighbourhood of Sivawaram. He found that there is a seam 1 ft. thick at 210 ft. from the surface, a 4 ft. seam at 272 ft., and a third seam 6 ft. thick at 313 ft. The coal of the second seam is reported as tolerably good. All this shows that the prospects of the Sivawaram country are favourable; the depth is at the same time considerable for Indian coal measures.

The Bezzadanol Barakars undoubtedly stretch away under the Ashwarapett country or into the Hyderabad lands, and perhaps also down under British ground towards Ellore. The depth to which borings would have had to be carried had they been started in Kanthi, and the uncertainty with which I should have had to point out sites for such operations, practically frightened me from advising Government to proceed further in the work of exploration. I am bound to admit this, in the face of such vastly bolder ventures as were carried out—fruitlessly as far as striking coal rocks was concerned—in the Narbada Valley. There, however, the question for or against the occurrence of coal at a reasonable depth, in a region advantageously placed for the railway, was practically decided; and it would have been for the best had a similar end been gained in this part of the Godavari district. This may yet be called for; it would be eminently satisfactory for us to have a decent field of our own within perhaps 20 miles of the canal, somewhere in the neighbourhood of Ellore; and on this last view I can only now say that before leaving this Presidency, I hope to prepare a notice of the conditions of the Damudas in that region in case of more extended boring operations. In the meantime, however, too much attention cannot be devoted to the development of the Nizam's fields, and I trust this description of them may lead to increased interest in them, not only with the public and the Government here, but with the Nizam's Government.

BRITISH MINING.—It is stated that Mr. Robert Hunt's—the Keeper of Mining Records—large and comprehensive work on the History, Discovery, Practical Development, and Future Prospects of Metalliferous Mines in the United Kingdom, under the title of "British Mining," will be published early next month by Messrs. Crosby Lockwood and Co., Stationers' Hall-court.

ANOTHER CURE OF BRONCHITIS, COUGH AND COLD (THIS WEEK) by DR. LOCKE'S PULMONIC WAFERS.—Mrs. Shepherd, 19, South Saint David-street, Edinburgh, writes:—"March 17th, 1884. I have always recommended Dr. Locke's Pulmonic Wafers to my friends for Bronchitis, Coughs, and Colds, and received as grateful thanks as though I had compounded them." They taste pleasantly, and effect a rapid cure. Price 1s. 1½d. and 2s. 9d. per box, of all Druggists.

Abstract of lecture delivered at the Government Museum, Madras.

REPORT FROM CORNWALL.

March 27.—Will there be any rise in the tin standards before Easter? That is a point upon which opinions will and do differ. There is a general belief that the figures of the month will be of a very favourable character, and that being so, in the natural course of events the rise, after all that has passed, should take place forthwith. But so short a time will elapse between the end of the month and the commencement of the disturbing influence of the Easter holidays that the prospect of immediate improvement seems hardly so decided as we could wish to see it, and indeed it would be better that there should be the delay, and the advance when once made adhered to, than that there should be any reaction or even check in the upward tendency. These are points that should be borne in mind by any who may be tempted not only to feel disappointment but act upon it should April not open with an advance.

Like good men of business, the tinmasters are quite capable of keeping their own counsel, and probably it is the non-recognition of that fact which has caused a little incredulity as to their attitude towards the tin market. There is really no reason, however, to doubt that substantial stocks are in hand waiting for higher prices, nor that there is more combined action among them than has been always usual of late. They never can expect to rule the market again like they did in the "good old times;" but there really has come about such a relationship between foreign supply and the demand for home produce that the game is much more in their hands now than it has been for a long time past. How far what is in store may be discounted beforehand is a question not easy to answer; but there must be some substantial good in any event, and the way in which shares are held show that this is very generally recognised.

We are disposed to believe that some permanent good results will accrue to mining generally from the manner in which the dues question has been taken up and dealt with of late. We are not, it is true, very much nearer, to all appearance, the general acceptance of the principle of dues on profits, and on profits only; but there certainly is something gained in the manner in which it is suggested, and in many cases accepted, that dues should cease while a mine is making calls—that the adventurers should not be called on to pay for the privilege of making a loss. It seems to us that we have really attained a position in this direction which should render it quite feasible, if not easy, to make this a recognised principle in future. In the early days of mining the lord always took his part with the adventurers, and if we can hardly expect him under the altered circumstances to become a shareholder now, at least he can share their lot to the extent indicated, which involves no personal responsibilities.

Though the directors of the Redruth Mining Exchange, at their annual meeting, had to express their regret that their dividend was not so large as in the previous year, yet most people will be of opinion that in these days a dividend of 8 per cent. is no way to be despised. Even Mining Exchanges cannot hope to pay 15 per cent. every year, though our Redruth friends appear to be sanguine that at no distant date they will be able to repeat the process, and certainly we are disposed to agree with them. The little difference of opinion as to this same committee representing both the Exchange Company and the Exchange itself might possibly be regarded as not unnatural, where two sets of interests are announced to be represented; but there does seem to be an advantage in having the one governing body, and there really is no reflection upon the manner in which things have been conducted in the past.

There ought to be good things in store, not merely for mining, but for mineral interests, in the widest sense, in connection with the approval by Parliament of the scheme to connect the Liskeard and Caradon Railway with the North Cornwall line. No one district of Cornwall has been left so thoroughly out in the cold as that which is traversed by this "mining link," and the capabilities of development are really very large indeed, so far as mining enterprise is concerned—in fact, there are large tracts here that are practically virgin ground.

REPORT FROM DERBYSHIRE AND YORKSHIRE.

March 27.—Short time is now the rule at the coal mines in most parts of Derbyshire, and no change for the better can be looked forward to for some months to come. A large portion of the coal raised in the county is for household and gas purposes, and the worst period of the year for these has yet to come. Prices have come down, so that owners have as much as they can do to make both ends meet; so that under such circumstances it is not surprising to find some of them seeking a little relief by a reduction of wages. The men at the Renishaw Colliery have been on strike about six weeks against a reduction of wages, and have been living on what they could obtain from the miners in their own and other districts, one week's distribution having amounted to 2s. 6d. per head. It is, therefore, not likely that the strike will last much longer under such trying circumstances. The Unstone Coal and Coke Company have also given their men the usual notice to determine the existing agreement, and it is understood that should the men not agree to a reduction of wages the colliery will be set down until better times, but for which the men are not in a position to wait. Most of the other owners of collieries are expected to adopt a similar course, as none are prepared to continue working their places at a loss.

The London trade has been comparatively quiet for some weeks past, but the Derbyshire collieries have had their full share of what business was done, and of course continue to do so. Clay Cross continues to take the lead, but it is closely followed by Langley Mill, Blackwell, and other places. Prices in the Metropolis have certainly come down, but they do not bear any comparison with what is charged at the pits, or sold by the agents in the Metropolis, for this now larger quantities are sent them than are required, and of course brings the price down, much to the advantage of the merchants, whose interests are certainly not identical with those of the colliery owners. The quantity of steam coal being sent away from the districts north and south is by no means large, for comparatively little is sent to any seaport for shipment, seeing that there is no port direct by any of the railways at a moderate distance. The local consumption, however, is large, and keeps up well, for the make of pig is kept up to the average, although prices are by no means good. But this is not so much a matter of consequence as it is in other districts, seeing that in Derbyshire the makers of pig are also large consumers of it. This is especially the case at Staveley, Stanton, Sheepbridge, and Clay Cross, where there are very large foundries, some of them being noted far and wide for all kinds of pipes, pillars, cylinders, and other specialities in the shape of heavy castings.

Some little improvement has taken place in a few of the Sheffield branches of trade; but several are still very quiet, so that there are a good many of the workmen unemployed, while others are on short time. The armour-plate mills still take the lead, so far as activity is concerned, and both Brown's and Cammell's are as busy as they well can be on them, and in all probability will be so to the close of the year. In ordinary plates for ship-building there is not so much doing, and the same may be said with respect to those of boilers, whilst the wire mills are the reverse of busy. Makers of both Bessemer and crucible steel have kept fairly going, the former in both ingots and billets, and also in some special qualities for springs, not so much, however, as now required for rails; but there has been no material falling off as regards the demand for axles and tyres, and other descriptions of railway material. Crucible steel, for general cutlery purposes, has not gone off so well; but in wheels and other castings a good output has ruled. The cutlery houses all round have not done so well since the commencement of the year, and the leading houses have had as much as they could do to keep their ordinary hands fully employed. Small manufacturers and those engaged in the inferior qualities of table, pocket, and pen knives have not done so well, many of the men being on short time. Tool steel has been in tolerably fair request for edge tools and files have met with a fair sale of late in the home, as well as in other markets. A fair business has prevailed for steel wheels in sections by the leading makers, and other branches seem to make fair progress. Several of the foundries are better employed than they were even recently, and, although machine castings are rather

quiet, there is now a steady business doing in water and gas pipes, kitchen and cooking ranges, ornamental stoves, grates, and general house castings.

The Coal Trade of South Yorkshire, so far as household qualities are concerned, is still quiet, and the collieries working short time. A fair business, however, is being done in steam coal, a good deal going to Hull for exportation, as well as for the use of the steam vessels connected with that port. Prices, however, are as low as they were, steam coal being still quoted at from 6s. 6d. to 7s. per ton at the pits. A full average tonnage of late has gone to Goole, principally for London, Plymouth, Gravesend, and other of our home ports. In engine coal for the Lancashire manufacturing districts in particular a moderate business has ruled over the Manchester and Sheffield Railway. The coke trade has kept up well, the output being large, considerable quantities being sent into Lincolnshire, Derbyshire, and other iron-smelting districts.

REPORT FROM NORTH AND SOUTH STAFFORDSHIRE.

March 27.—The amount of work doing at the collieries does not show an augmentation upon last week; prices, too, are not advanced. Indeed, such a tendency would be impossible now that the owners have determined, as I last week stated, to bring down wages. What amount of reduction may be determined upon is at present wholly problematical. There are already indications of resistance by the men, yet a reduction in some form or other is regarded by the market generally as inevitable. Prices this week are quoted at from 7s. to 7s. 6d. for Staffordshire mill coal, and 6s. for forge. House coal from the Chase is quoted 10s. for best deep, 9s. for deep one way, and 8s. for cobbles. Furnace coal (Staffordshire) is 9s. 6d. to 10s. From the Chase forge and mill coal can be bought at lower prices than those of South Staffordshire proper by from 6d. to 9d. per ton. Native pig-makers report that current output is going away steadily from the furnaces; new business is, however, largely postponed until the Quarterly Meetings, which are fixed for April 9 and 10. Willingsworth (native) pigs were quoted 42s. 6d. per ton, cinder qualities are 37s. 6d., and some makers are even willing to accept 35s. Orders for manufactured iron are irregularly distributed, but do not show an increase upon the week. Marked bars are 8l. 2s. 6d. to 7l. 10s., and medium qualities 6l. 15s. to 6l. 10s. Tank-plates are 7l. to 7l. 10s., and strip iron is 6l. 2s. 6d. to 6l. 7s. 6d.

The annual meeting of the Chillington Iron Company (Limited) was held on Saturday at Wolverhampton. The Chairman, in moving the adoption of the report, accounted for the loss of 5419l. upon the year's working—by depression in trade. However, everything the company produced was now increasing in popularity. Referring to a statement as to alleged underselling by the company, he denied that such allegations had any foundation. As to the recommendation contained in the report to exercise the borrowing powers of the company to pay off temporary loans which had been negotiated to provide cash capital, he stated that the firm had really never had any working capital independently of these loans. In the discussion which followed it was mentioned that the total losses of the company amounted to 50,000l., and that it had not paid any dividend since 1876. The motion for the adoption of the report was met by an amendment that a committee of investigation should be appointed to enquire into the company's affairs. The amendment was, however, lost, and the report was adopted.

The colliers in the Dudley district are again becoming unsettled. A meeting of the disaffected was held on Tuesday night, under the presidency of Mr. H. Southall, when it was determined—(1.) That we object to a wages board based upon less than 3s. 8d. as a minimum in wages; and (2.) that we do not submit to a reduction in the present rate of wages.

The whole of the miners employed at the Clough Hall Collieries and the New North Staffordshire Coal and Iron Company's pits have ceased work, in consequence of some of the North Staffordshire colliery proprietors have given notice for a reduction of wages. The strikers have had a meeting, and have unanimously resolved to resist the demand.

TRADE OF THE TYNE AND WEAR.

March 27.—There is little change in the state of the Coal and Coke Trades. The steam coal collieries north of the Tyne continue to be fairly employed. Shipments to the North of Europe and the Baltic are improving, and there is a good demand for large steam coals. There is also a good demand for bunker and smithy kinds. Some of the gas, coalworks are making short time, but some of the best works are still fully employed. Most of the large coking works are steadily employed, as they hold contracts for all they produce. At second-class works there is short time, and the make is being reduced. The house coalworks are in a worst position at present; the general mild winter in Europe has had a very depressing effect in this branch of the coal trade, and prices on the London and other markets are low. The depression is, therefore, felt severely at the Hetton and Lambton Collieries, and other first-class house coalworks on the Wear. New winnings for coal have been rare in Northumberland and Durham during the past few years; the coal fields are, indeed, well occupied, and the output of coal has been quite up to the demand. Messrs. Strakers and Love, who work one of the most extensive coking fields in Durham, have 7000 acres of coal royalty, and they are now about to sink a new shaft in connection with their works at Brandon. The new shaft, however, will not be used for coal drawing, but as an air-shaft, and it will improve the ventilation of these extensive works. The shaft will be sunk from the surface to the Busty seam, and it will be 12 ft. in diameter when finished. The shipments of coal and coke at Tyne Dock, and at the other shipping places on the Tyne and Wear, have been fair during the week. At Tyne Dock the shipments were 82,000 tons, rather below the average, but still 13,000 tons above the quantity for the corresponding week last year. Shipments of coke to Spain and other foreign ports are improving considerably, still there is a considerable quantity of coke in the market. The reduced make of iron in Cleveland, of course, accounts for this.

The Iron Trade continues steady and firm, and although little advance has yet been got in prices, there is certainly an upward tendency. The greatly reduced make has improved the position so far. There has also been a marked advance in the price of forge iron during the past two weeks. It is expected that the German demand will be materially increased in April. The finished iron trade on the whole is, however, in a bad state, and prices are very low. Bars are from 4l. 17s. 6d. to 5l.; ship-plates, 5l. Pig-iron No. 3 is quoted 37s. 3d., makers ask 38s. The shipments of pig-iron for the week reached 16,415 tons, and 3550 tons of manufactured iron. Messrs. Connal's stock of warrants is 60,737 tons.

Some important experiments have just been concluded, made to test the suitability of basic steel for ship construction. The experiments have been conducted by Mr. William Parker and Mr. H. Cornish, officers of Lloyd's Register Committee. The steel manufactured by the North-Eastern Steel Company, and rolled by Messrs. Dorman and Long, of Middlesbrough, was subjected to various tests by those gentlemen—hot and cold tests, tensile tests, and timber tests—the material was subjected to the same treatment that a ship's frame would undergo in ordinary shipbuilding. As the result of these experiments they have reported to the committee of Lloyd's Register that so far as the requirements of Lloyd's Register are concerned, steel made by the basic process is equal to steel produced by the acid or hematite process. In accordance with these recommendations the committee have now informed the North-Eastern Steel Company that such metal may be used for ships built under the inspection of their surveyors to class in their society, subject to the usual tests applied to steel plates and angles.

During the past few years a considerable quantity of manufactured iron has been imported into this country from Belgium. These imports are mainly cast-iron girders for building purposes, and they have been brought into the Tyne and Wear in considerable quantities. An attempt is now to be made by some gentlemen in the iron trade on the Tees to secure this trade. Cast-iron girders are to be manufactured there on a large scale, and it is expected that the

makers will be able to sell them at such a price as will enable them to compete with the Belgian iron manufacturers.

The Shipping Trade has not improved much here, outward freights have improved a little, and a few more ships have been got to work, but a considerable number are still laid up in these rivers waiting for better times. There is still considerable excitement about the proposed Shipping Bill of Mr. Chamberlain, but the fierce opposition to the principle of the Bill has calmed down considerably, and there is now more disposition to discuss its provisions. There appears to be a growing conviction that there is a necessity for a Shipping Bill, and a well-digested measure would no doubt have a tendency to save both lives and property at sea. It was expected that Mr. C. M. Palmer, the Member for North Durham, would have an interview during the present week with the Premier, for the purpose of discussing the question, but it now appears that this interview has been postponed in order that some proposals of the ship-owners as a body may be taken into consideration.

The Iron Shipbuilding Trade continues in a dull depressed state, and in consequence marine enginebuilders are still paying hands off. A considerable number of skilled men have been paid off at Messrs. Palmer's works at Jarrow, and at other works. These men have, however, been absorbed to a considerable extent at other works, where there is still a considerable amount of work on hand. The engineers on these rivers are now seeking for a reduction of wages, and a meeting of delegates was held on Monday, when the question was considered. As we anticipated last week, the men will offer a considerable amount of opposition to the proposed reduction. It was resolved at the meeting that any men coming out on strike shall receive the support of the Amalgamated Society of Engineers. At the great works of Sir William Armstrong and Co., at Elswick, there is much activity in all departments, especially in the gun and gun-carriage department, where a large number of field guns for various governments are under construction. An order has also been received within the past few days for the construction of three 110 ton guns for the British Government. These guns will be the heaviest pieces of artillery in the world. A large new fitting and turning shop has just been opened at these works, and in this shop alone 500 hands are expected to be employed. The total number of hands employed at these works now amount to nearly 5000 hands. Considerable progress has been made here with the extensive shipbuilding yard and steelworks. Steel-plates, and all other necessary steel for shipbuilding will be produced here, and also steel used in the manufacture of field and other guns. The produce of the steelworks will, therefore, be mainly consumed on the premises in the manufactures now carried out by the firm, and this, of course, will be a great advantage.

REPORT FROM LANCASHIRE.

March 27.—Business in the Coal Trade of this district fluctuates with the variations in the weather, which is an indication that the recent improvement in the demand can only be regarded as of a temporary character. The recent few days of warm weather had a perceptible effect upon the demand for the better classes of round coal for house fire purposes, and in addition to this buyers, in anticipation of some possible reduction in prices with the close of the month, have been holding back orders. The weight of business doing during the past week has, consequently, shown a falling off; pits have only been kept going about three and a-half to four days a week, and even with this limited output stocks have been accumulating. Except, however, that for quantities to clear away stocks under bond sellers in some cases have been open to entertain offers at under current rates, there is no material change in the quoted pit prices, and the leading Manchester firms are making no alteration in their list rates for next month. At the pit mouth prices average about as under:—Best Wigan Arley, 9s. to 9s. 6d.; second qualities, 7s. 6d. to 8s.; Pemberton Four-foot, 7s. to 7s. 6d.; common house fire coals, 6s.; steam, 6s.; forge coals, 5s. 6d. to 6s.; burgy, 4s. 6d. to 5s.; best slack, 4s. to 4s. 3d.; and good ordinary qualities, 3s. 3d. to 3s. 6d. per ton. For shipment there has been a moderate business doing at low prices, good ordinary Lancashire steam coal averaging about 7s. 3d. to 7s. 6d. per ton delivered at the High Level, Liverpool, or the Garston Docks.

For coke the demand recently has been falling off, but prices are still maintained at about late rates, best qualities averaging 10s. up to 12s., and common coke about 8s. per ton at the ovens.

The question of a reduction in wages continues to be talked of in the coal trade of this district, and no doubt any further general reduction in price would compel some action to be taken, but at present nothing definite has been done in this direction.

In the Iron Trade business all through continues in a depressed condition, and both buyers and sellers seem to be uncertain what course to take with regard to the future. Pig-iron makers still hold pretty firmly to late rates, but there is little or no business offering, except that here and there buyers would give out orders at under current rates. Local and district makers, however, still quote about 44s. to 44s. 6d., less 2½, as their minimum price for forge and foundry qualities delivered equal to Manchester; but on the basis of these figures buyers show no disposition to give out orders. Outside brands, such as Scotch and Middlesbrough, are without material change. In Scotch merchants continue to offer at about 3d. to 6d. per ton under makers' prices, and North Country iron remains about as last quoted; but there is little or nothing doing to actually test values. Hematites still meet with only a very slow sale, and 56s., less 2½, remains about the nominal price for good foundry brands delivered into this district.

In the Manufactured Iron Trade there is a continued downward tendency in prices, most of the local makers are getting very short of orders, and with outside brands competing keenly in this district they are compelled to take lower prices to secure orders. For good local and North Staffordshire bars, delivered into this district, 5l. 12s. 6d. per ton is about the average price, but lower class local brands are to be bought at 5l. 15s., and Cleveland bars at 5l. 12s. 6d., or even at a little less in some cases. Ordinary qualities of sheets average 7l. 10s., with the better makes 7l. 15s.; hoops, 6l. 5s. to 6l. 7s. 6d.; and common North Country plates and angles 5l. 10s. to 5l. 12s. 6d. per ton, delivered into this district. Engineers in this district are kept moderately employed, and in some special branches are busy, but for general ordinary work orders are running out, with but little new work coming forward, and this only secured at extremely low prices.

REPORT FROM NORTH WALES, SALOP, AND CARDIGAN.

March 27.—The local railway bills appear to be making progress in Parliament. The Cambrian Railway invite subscriptions for 20,000l. for the purpose of improving the port of Aberdovey. The making of Aberdovey a great port was one of the ideas of the original promoters of the Cambrian railways. It was attempted to make it a considerable fishing port, as well as a point of departure for Ireland, but the panic of 1864 came too soon. Latterly a trade has been started between this port and America by the Aberdovey Export and Import Company. Among the lead mines of Cardigan the Tan-yr-Alit has been quietly successful for a long time. At the present time arrangements are making for its transfer to a Limited company in order to the more vigorous working of the mine. Several fine courses of ore have been worked for a good while, and are still worked.

The manufacturing works along the estuary of the Dee are busy. These are various mining machinery, paraffin, superphosphate, smelting and chemical. The cobalt mine near Rhyl and the manganese mine near Abergele still continue in successful work. The slate depot near Chester is scarcely as much used as it was, the merchants ordering direct from the quarries, where larger stocks are necessarily kept to meet the requirements of sudden orders. The Geologists Association have just published in their Proceedings an interesting account of the geology of the Snowdon district, with sections showing the various groups of strata described by me a few weeks ago. The Association visited the district in their long excursion last summer.

The collieries all keep in work, and we hear less complaints as to

prices. The Mold district is a little neglected, but the special trades of Buckley Mountain coal, bricks, and pottery, are in a tolerably good condition. Opportunity has been taken, and very rightly, of the depression in lead mining to agitate for, and in many cases to obtain, a reduction of rents and royalties, together with a remission of rents while a mine is not paying its way. This rule will have to be applied to all descriptions of mining property, making the mineral owner a sharer of the adversity as well as the prosperity of the miner. It is the exorbitant dead rents, as well as the high royalties asked for that now to a great extent prevent the further development of the coal resources of North Wales.

TRADE IN SOUTH WALES.

March 27.—Although there is an evident weakness in the demand for second-class qualities of coal, first-class maintain their position with great firmness. Cardiff sent away last week 138,849 tons foreign and 13,469 coastwise; Newport, 37,988 tons foreign and 17,978 coastwise; Swansea, 14,622 tons foreign and about 10,000 coastwise. Prices range from 10s. to 12s. 3d. per ton. House coal is in weak demand, as usual at this time of year. The patent fuel trade is somewhat better. Swansea sent away last week 9791 tons, and Cardiff 2027. The freight market is inactive.

It was stated in the Nautical Magazine, a long time ago, that ship-builders were over-building, and they were warned at the time that the result must show itself in time in a most disastrous manner. Shipowners have sufficient anxiety at the present moment in their endeavour to keep their heads above water without being worried and harassed by the Board of Trade. The following notice, which was affixed at the works of the Castle Steel and Ironworks last Saturday will tell its own tale:—"I regret to inform you that, owing to the bad state of the shipping trade and lack of orders, we are compelled to slack down a certain number of our men, who will be paid up to-night, as per former notice. I trust the slackening off will be merely temporary, as we have a number of ships on the stocks in a forward state, and no doubt we shall get the first chance of a sale. I desire to express to you the regret of Mr. Mowatt at having to part with so many good men, and to assure you that, on the very first opportunity, if you are disengaged, your services will be acceptable. The fall in the price of shipping is so great that it may be necessary to take a lower price for the ships; but, before doing so, we should have to get a firm contract, signed by you or others, for the construction of the vessels at a lower rate of wages, so as to bear a portion of the loss to us. Many builders are now selling at less than cost price merely to keep their yards going; but, as we are free from liability, and the whole of the ships on the stocks, with the exception of one on order, are the property of the undertaking, and everything paid for to date, we prefer waiting instead of selling at less than cost price, which is now being done elsewhere.—For the Castle Steel and Ironworks, SAMUEL LAKE, Manager."

The Jersey Iron and Steel Works were re-started on Monday, and on the same day a blast-furnace which was damped down in 1882 was re-started. Iron was sent away from Newport last week to the amount of 3364 tons, while Cardiff exported 1279 tons. Iron ore has come in at Cardiff from Bilbao to the extent of 14,577 tons, and 2670 from other sources; Newport received 5905 tons from Bilbao, and 1950 from other sources. There is no improvement in prices.

The Tin-Plate Trade is decidedly better. The lowness of stocks has at last placed the whip in the power of the manufacturers, who are selling IC coke at from 15s. to 16s. per box, while "wasters" readily realise 14s. 9d.

Our remarks on the suitability of Swansea as the site for a technical college were read out at a Town Council meeting this week in that town with evident satisfaction. The present Mayor is a man of great energy and business capacity, and may carry this matter to a successful issue. Wales has not at present her fair share of Government grants for education as compared with Scotland and Ireland by some 90000l. per annum, and it will only be an act of justice to give Swansea, in addition to the 20000l. which it is anticipated will be given to Aberystwith, a share of the remaining 70000l. for the purposes of a technical college. Swansea may claim to be called the metallurgical capital of the British empire.

WAGES DISPUTE IN THE WARRINGTON WIRE TRADE.—For several weeks past the wireworkers in the Warrington district have been stopped, owing to a strike on the part of the wire drawers against a reduction in wages. The employers are endeavouring to enforce a reduction ranging from 10 up to 40 per cent., according to the class of work, and this the men are resisting. An attempt has been made to come to an arrangement, but this has failed, and at present there is no prospect of a settlement. The Warrington firms for some time past have been unable to compete with the German manufacturers in the Colonial markets, owing largely to the much higher rate of wages which have to be paid to the English workman; and in the event of the wire drawers persisting in their refusal to accept the reduction it is suggested that fresh men should be trained to the work on the basis of the German rate of wages.

Registration of New Companies.

The following joint-stock companies have been duly registered:—

THE PATENT ANTHRACITE FUEL SYNDICATE (Limited).—Capital 25,000l., in shares of 100l. Constructing, working, or using machinery and plant for the manufacture of patented fuel in the United Kingdom. The subscribers (who take one share each) are—W. Cruickshank, 32, Fenchurch-street; T. E. Weigall, 32, Fenchurch-street; C. K. B. Troup, 18, Torrington-square; C. D. Hamilton, 6, Craven-street; G. Cruickshank, 16, Clifford's-inn; R. Condy, 15, Garlick Hill; W. T. Allen, 67, Upper Thames-street.

MUTUAL STOCK AND SHARE COMPANY (Limited).—Capital 20,000l., in shares of 1l. The business of stock and share brokers and dealers and financial agents, loan and money brokers, &c. The subscribers (who take one share each) are—J. Ambrose, 13, Everleigh-street; J. Hollow, Leyton; P. R. Lescine, Leyton; J. Ruse, Lee; J. Macdonald, 37, Clement's-lane; J. Stephenson, 26, Suffolk-street; F. Houghton, 28, Chilton-street.

THE UNIVERSAL PLATE-GLASS INSURANCE COMPANY (Limited).—Capital 20,000l., in shares of 1l. A general insurance business connected with plain and ornamental and other kinds of glass. The subscribers (who take one share each) are—G. A. Harrison Ainsworth, 107, Cannon-street; F. Temple-Allen, 66, Finsbury Pavement; J. T. Watson, 23, Leadenhall-street; J. Wheatley, 23, Leadenhall-street; J. S. Walter, 12, Adde-street; C. Denny, East Dulwich; G. E. H. Pearce, 9, Crosby-square.

EAST LANCASHIRE MUTUAL AID ASSOCIATION (Limited).—Capital 10,000l., in shares of 5l. The business of a property and advance company in all branches, also of financial agents. The subscribers are—W. C. Hargreaves, Burnley; J. Stephenson, Burnley; S. T. Holden, Burnley; S. T. Kidding, Padiham; P. E. Roberts, Burnley; R. J. R. & Co., Burnley; J. J. Peers, Darwen, 5.

COAL MINES VENTILATING FAN COMPANY (Limited).—Capital 50,000l., in shares of 5l. To manufacture, deal in, and sell all such machines, appliances, fans, engines, water-wheels, &c., as may be necessary for utilising and developing a certain patent acquired by this company. The subscribers (who take one share each) are—J. M. Stobart, Ryde; D. G. Sandeman, 15, Eldon-road; P. D. N. Oxenden, 7, Elm Park-gardens; H. Gardner, 25, Craven-terrace; C. S. de Bag, 9, Victoria Chambers; C. Robinson, 152, Malpas-road; F. L. Jeyes, 9, Victoria Chambers.

ANGLO-AMERICAN CASINGS COMPANY (Limited).—Capital 10,000l., in shares of 10l. The business of buyers, dealers in, and sellers of sheep's casings and skins, hogs' and pigs' casings and skins, and of general merchants and commission agents. The subscribers (who take one share each) are—A. Glen, 13, Springdale-road; F. C. Gooding, 76, New-street; S. Wise, 17, Mile End-road; R. Thomas,

Tottenham; C. Carter, Brixton; A. Francis, Camberwell; J. Bennett, W. Idon.

THE SOUTHERN INLAND NAVIGATION COMPANY (Limited).—Capital 35,000l., in shares of 100l. The usual business of a shipowner. The subscribers (who take one share each) are—R. Thomlinson, 101, Leadenhall-street; G. Thomson, Liverpool; R. Wakeham, Liverpool; J. Thomlinson, Liverpool; J. Parkes, Liverpool; F. G. S. Kartharn, Liverpool; W. Clark, Liverpool.

THE LONDON PARAFFIN, WAX, AND OIL COMPANY (Limited).—Capital 50,000l., in shares of 10l. The manufacture of paraffin, wax, and oil, in conjunction with certain acquired patents. The subscribers (who take one share each) are—W. E. Cadman, 70, Fellows-road; J. B. Gooding, Ealing; W. Newton, 11, Mitre-court; W. Doig, 75, Marquess-road; J. K. Field, Battersea; F. Clark, 12, Warren-road; D. C. Doig, 39, Lombard-street.

THE LANCASHIRE PEAT FIRE LIGHT COMPANY (Limited).—Capital 10,000l., in shares of 1l. To acquire and continue a business established at Queen-street, Miles Platting, Manchester. The subscribers (who take one share each) are—R. Dawson, Miles Platting; J. N. Smith, Lower Broughton; J. Smith, Manchester; T. Mayor, jun., Salford; J. Chambers, Stockport; H. L. Williams, Manchester; T. Pollitt, Manchester.

THE LANCASHIRE AND CHESHIRE BANKING COMPANY (Limited).—Capital 1,000,000l., in shares of 20l. To acquire and carry on the business of the Cheshire Bank and Manchester and Oldham Bank, or any of them. The subscribers (who take one share each) are—J. W. D. Mather, Stretford; J. L. Aspland, Dukinfield; G. W. Crabb, Williston; T. Aldred, Manchester; W. Berry, Manchester; T. C. Mortimer, Manchester; M. E. Rae, Blackburn.

THE PALACE MANSIONS COMPANY (Limited).—Capital 40,000l., in shares of 5l. To acquire a certain property for the purpose of erecting and maintaining thereon all kinds of buildings. The subscribers are—R. B. McCoen, Ewell, 20; W. O. Swanston, Uxbridge, 20; E. L. Ryoes, 59, Warwick-road, 20; J. H. Batten, 6, Campden Hill, 1; T. Lewis, 2, Albany-court, 1; W. C. Vokes, 30, Limerston-street, 1; G. F. Pearce, 79, Hemmingsford-road, 1.

THE ALBION MILL COMPANY (Limited).—Capital 20,000l., in shares of 500l. To acquire certain mills and to carry on therewith a cotton manufacturing, weaving, and spinning business. The subscribers are—E. Sutton, Great Harwood, 2; A. Mercer, Great Harwood, 2; D. Birtwistle, Great Harwood, 1; W. Mercer, Great Harwood, 1; E. W. Riley, Great Harwood, 1; T. Brennan, Great Harwood, 1; L. Bourne, Broughton, 1.

THE BRIGHTON AND SOUTH COAST TRAMWAYS AND CARRIAGE COMPANY (Limited).—Capital 50,000l., in shares of 10l. To construct, equip, maintain, and work tramways in and between Brighton, Rottingdean, Newhaven, and other places in Sussex. The subscribers (who take one share each) are—J. J. Bennett, Barnsbury; E. Toovey, 28, St. Swithin's-lane; J. W. Ellis, 55, Chancery-lane; J. T. Choad, 34, Union-street; A. Wilkie, Whitechapel; W. H. Sargeant, 28, Budge-row; T. Chatterton, 38, Linden-grove.

CHURCH COLONISATION LAND SOCIETY (Limited).—Capital 250,000l., in shares of 10l. To acquire any lands and other real and personal property abroad, and to carry on a general colonisation, agricultural, financial, and commercial business in connection therewith. The subscribers (who take one share each) are—R. G. Allen, Liverpool; J. Bridges, Liverpool; J. C. Sharpe, 19, Fleet-street; A. B. Stoney, 6, Stone Buildings; C. E. R. Campfield, Battle; H. Fowler, West Dulwich; E. C. Wicks, 50, Mervan-road.

THE HULL AND EAST COAST ROPE AND SHIP CHANDLERY COMPANY (Limited).—Capital 10,000l., in shares of 10l. To acquire and carry on at Great Grimsby a business of ship chandlers, store dealers, provision merchants, &c. The subscribers (who take one share each) are—C. H. Huss, Great Grimsby; S. Willson, Great Grimsby; J. R. Westerman, Hull; J. A. Towney, Hull; H. Gray, Hull; J. G. Krause, Great Grimsby; T. Moore, Hull.

DICIDIO PIER COMPANY (Limited).—Capital 30,000l., in shares of 50l. To construct, lay down, and maintain a pier or piers, wharf or wharves, warehouses, &c., in the province of Santander, Spain. The subscribers (who take one share each) are—A. Edwards, 5, Newman's-court; A. W. Edwards, 5, Newman's-court; W. Carter, jun., 5, Fenchurch-street; F. Tate, 5, Fenchurch-street; T. P. Roy, 5, Fenchurch-street; H. H. Witty, Billiter House; R. C. Wyatt, Billiter House.

THE MUNICH ICE COMPANY (Limited).—Capital 50,000l., in shares of 1l. The manufacture and supply of ice. The subscribers (who take one share each) are—J. P. Leith, 8, Dorset-square; J. C. Thynne, 'The Cloisters'; W. W. R. Burgess, 13, Weston-road; H. J. Bass, 13, Henrietta-street; A. Mason, 16, Barnard-street; F. Buchanan, Ilford; W. Billington, Bow.

THE WHITEHAVEN UNITED GAS COMPANY (Limited).—Capital 60,000l., in shares of 10l. To acquire and undertake the whole of the property and liabilities of the Whitehaven Gas Light Company (Limited). The subscribers (who take one share each) are—J. Hodgson, Whitehaven; J. H. Robinson, Whitehaven; H. Kenyon, Carlisle; W. Hodgson, Whitehaven; J. Robinson, Whitehaven; A. Helder, Whitehaven; J. Porter, Whitehaven.

THE HUNGARIAN GREAT SOUTHERN RAILWAY COMPANY (Limited).—Capital 400,000l., in shares of 20l. To acquire a concession, lay down, equip, maintain, and work a system of railways in the said country. The subscribers are—D. D. Pontifex, Devonshire Club, 100; G. B. Malleson, 27, West Cornwall-road, 50; J. McMillan, 5, Paper Buildings, 25; H. S. Neild, Wimbledon, 25; C. Nicholson, 8, Laurence Pountney Hill, 10; G. N. R. Goddard, 16, Regent-street, 25; E. H. Pollard, Temple, 25.

THE CITY OF LIVERPOOL SUBURBAN OMNIBUS AND CARRIAGE COMPANY (Limited).—Capital 150,000l., in shares of 1l. To establish and carry on a local business of omnibus and cab proprietors, carriers, agents, &c. The subscribers (who take one share each) are—E. Grindley, Liverpool; R. W. Pallen, Liverpool; S. L. Gregson, Liverpool; T. H. Sheen, Liskeard; T. Morris, Liverpool; J. B. Morgan, Liverpool; J. Riddin, Liverpool; W. H. Blain, Liverpool.

WEST KIRBY "MONT DORE" (Limited).—Capital 100,000l., in shares of 5l. To erect and maintain hotel and bathing establishments, with all necessary conveniences, &c. The subscribers (who take 20 shares each) are—P. M. Braidwood, Birkenhead; J. H. Dawes, Trentholme; D. Hollins, Stoke-upon-Trent; J. H. Montrosor, 8, Austin Friars; D. G. Sandeman, 15, Eldon-road; E. J. W. Stratford, West Malling; L. S. Forbes, 14, Cavendish-square.

CONSOLIDATED LAND AND CATTLE COMPANY (Limited).—Capital 750,000l., in shares of 5l. To purchase or otherwise acquire, settle, improve, and cultivate lands, franchises, and hereditaments in the United States or elsewhere. The subscribers (who take one share each) are—Lord Thurlow, 33, Chesham-place; F. C. Pocklington, Woburn; H. R. Lewis, Bartholomew House; E. W. B. Loving, Langham Hotel; J. McCulloch, Stranraer; G. W. F. Robinson, 15, St. Paul's-road; A. Fletcher, 1, George street.

THE TRANSVAAL INVESTMENT AND GOLD COMPANY (Limited).—Capital 300,000l., in shares of 1l. To purchase and otherwise acquire, settle, improve, develop, and cultivate properties, lands, and hereditaments in the Transvaal Republic, and elsewhere in South Africa, and in particular with a view thereto to adopt and carry into effect an agreement entered into. To develop the resources of any acquisitions made by the company, and to stock, breed, and deal in all kinds of stock, cattle, sheep, and produce, and carry on all operations connected with and incidental to all kinds of mining, whether for gold, precious stones, &c. The subscribers (who take one share each) are—G. S. Logie, 2, New-street, accountant; R. W. Brown, Walthamstow, accountant; G. C. Harvey, Anerley, gentleman; E. E. B. Kidder, 91, Finsbury Pavement, solicitor; A. J. Robins, Rotherhithe, clerk; A. Wilkin, Gravesend, gentleman; E. Schubert, 32, St. Swithin's-lane, accountant. The majority of subscribers to the Articles of Association will name the first directors, whose numbers must at no time be less than five or exceed nine.

THE MINERAL ASPHALTE COMPANY (Limited).—Capital 50,000l., in shares of 5l. To manufacture, lay down, and sell asphalt of all descriptions and to acquire the full benefits of "Tottrell's Imperishable Asphalt." The subscribers (who take 40 shares each) are—R. J. Jenkins, 16, King William-street; E. Rawlings, 3, Victoria-street; J. H. Brass, Chelsea; H. Allcock, 128, Bishopsgate-street; H. E. Wallis, 9, Bridge-street; F. Newton, 16, King William-street; J. Norton, 24, Old Broad-street.

Meetings of Public Companies.

UNITED MEXICAN MINING COMPANY.

A general meeting of shareholders was held at the Guildhall Tavern, on Monday,

Mr. GEO. HARRIS in the chair.

Mr. W. M. BROWNE (the secretary) read the notice convening the meeting, and the several special resolutions passed at the meeting on March 3 were submitted and unanimously confirmed—"That clause 6 of the company's Articles of Association be altered by omitting therefrom the words 'There shall not be a division of any share of 30l. into sub-divided parts.' "That the Articles of Association of the company be altered by the addition thereto of the following regulation (to be called Article 6A):—"The company may subdivide shares in the manner and with the incidents prescribed or allowed by the Companies Act, 1867, and may modify the conditions contained in the Memorandum of Association accordingly." "That out of the accumulated undivided profits of the company the sum of 2½d. per share be returned to the shareholders holding shares of 30l. each with 20l. 12s. 8½d. paid up thereon, in reduction of the amount paid up on the said shares respectively, and that the amount unpaid on each share be accordingly increased by the like amount of 2½d. per share."

The CHAIRMAN: Gentlemen, that concludes the whole of the first part of the meeting, and now an extraordinary meeting will be held for the purpose of passing these further resolutions, which are consequent on the first resolutions which we have just confirmed, and which we could not pass until those resolutions had been confirmed. We are now in a legal position to consider these second resolutions.—Mr. MILBURN said he would like to ask a question with regard to the third resolution, which had just been confirmed. They seemed to deduct a small amount from the 20l. 12s. 8½d. and then to add it on again.—The CHAIRMAN: The shares are now 20l. 12s. 8½d. paid up, and if you deduct 2½d. from it you make the shares 20l. 12s. 6d., which is divisible by three, so that your liability will be 2s. 6d. per share on each 60l. share. It does not increase your liability, but you get the money in your pocket. It is a return.

Mr. SMITH (a solicitor): You do not return to the shareholders the amount unpaid on each share. The amount unpaid on each share is increased, but it is not recalled. The 2½d. per share is only returned for the arithmetical object of dividing without a decimal fraction.—The CHAIRMAN, seconded by Mr. GRABN.—That each of the existing shares of 30l. each be subdivided into three shares of 10l. each, and that the conditions contained in the Memorandum of Association be modified accordingly: Provided that in such subdivision the proportion between the amount which is paid and the amount which is unpaid on each share of 10l. each, shall be the same as in the case of the existing share of 30l. from which it is derived, and, consequently, that each existing share of 30l. having 20l. 12s. 8½d. paid up thereon, shall be represented by three shares of 10l. each, having 17s. 6d. per share paid up thereon; and so in like proportion, in cases where any greater or less amount than 20l. 12s. 8½d. is paid up on any existing share."

The CHAIRMAN then moved—"That the directors may issue and dispose of three shares of 10l. each, having 7s. 6d. per share paid up thereon, in lieu of each or any of the 30l. shares remaining to be issued and disposed of as a share having 20l. 2s. 8½d. paid up thereon, under Articles 2 and 3 of the company's Articles of Association, and may pay or appropriate, out of the profits of the company, a sum of 2½d. in respect of each three shares so issued or disposed of, to make up the amount of 6s. 2s. 8½d. by the said Articles provided to be credited as paid up thereon."

Mr. MORRISON: These shares are the shares you referred to at the last meeting as "old gentlemen."—The CHAIRMAN: Yes.

Mr. MORRISON: It seems to me that we are giving you power to do as you like with these shares by these resolutions. I should like to have some assurance from the directors that they propose to deal with them in a way which will not affect the market price of the shares. There are 1700 of those "old gentlemen" shares, or something about that number, and if those are thrown upon the market indiscriminately it will have a bad effect upon the other shares. With all respect to you—and I am sure you will take the matter into your serious consideration—I suggest that you should do nothing hastily with these shares in the meantime, but that they should be offered to the shareholders according to their respective holdings at a price approximate to the market price, and that it should be paid up capital. I know that you require money to carry on the business, but you do not require it all at once. It could be done gradually.

The CHAIRMAN: They will be issued as 10l. shares, with 9l. 17s. 6d. paid, and will merge into the shares the same as we hold. The directors do not intend to deal with the shares without taking the sense of the shareholders as to the way they shall be dealt with—whether sold, or offered to the proprietors, or offered in a lump at a price. They do not intend to arrogate the right to themselves, but they only want to convert them into one plain capital, and nothing else, for the present. (Cheers.)

Mr. HORNCASTLE asked whether all the 1700 shares were available for the purpose of the company's capital.—The CHAIRMAN: No; about 500 have been claimed, leaving about 1200 shares, and we are still open to receive evidence. We do not intend to shut the door hard and fast, we intend to wait. It is a thing which cannot be done in a moment, and as it will take some little time to convert these into 10l. shares, and as there is still a meeting to come, we shall still receive any demand upon us up to that time. These shares not claimed will be converted, and we shall have power to deal with them, or apportion them to the shareholders, as the shareholders choose.

Mr. MORRISON: I am satisfied with your assurance that you will not deal with these shares without consulting the shareholders.

A SHAREHOLDER asked whether there was any interest due on those shares? The CHAIRMAN: The gentlemen who claim the shares are entitled to a dividend of 1l. 2s. 6d., which they can claim, but they have to pay us 30s. per share when they convert. Perhaps the question of interest had better not be talked of in a public room.—Mr. MORRISON seconded the resolution, and it was carried unanimously.

The CHAIRMAN: The next resolution refers to the "ancient gentlemen" as we call them. I move—"That notwithstanding anything in clause 7 of the company's Articles of Association the directors may of their own authority make a call or calls to the extent, on the whole, of 10s. per share on each or any of the shares now authorised to be issued as having 9l. 7s. 6d. each paid up thereon, so as to bring the same to an equality with the other subdivided shares of 10l. each in the company, and such call or calls shall be payable at the times and places appointed by the directors, in the same manner and with the same consequences as to interest and powers of sale in default of payment as if made by the company under the said clause 7, which clause (save as hereby modified as aforesaid) shall remain in full force."—Mr. GOLDSMID seconded the motion.

Mr. SMITH: The object of that resolution is to bring the old shares in the old association upon an equality with the existing shares of this company. It has no actual effect upon the shares of the existing company.—The motion was adopted unanimously.

The CHAIRMAN said that concluded the formal business of the meeting; but he might announce that a further meeting to confirm those resolutions would be held on April 18 next.

Mr. WILLIAM ABBOTT: The question which I was about to rise to ask has been answered by yourself, sir, and that is that it will be necessary to hold another meeting, and that that meeting will be held forthwith. I shall be glad to know if that is the earliest possible date on which it can be held.—The CHAIRMAN: Yes; April 18.

Mr. WILLIAM ABBOTT: I am sure, sir, it must be very satisfactory to you and your colleagues to see the very satisfactory way in which your proposals are met by the proprietors; and it is equally satisfactory to the proprietors that the meeting which has been held lately under this reconstruction scheme has had a beneficial effect upon the property of the company. You may remember that since we met last time the shares of the company have advanced about 25 per cent., and they have had a considerable rise to-day, upon what I should be glad to understand; and if you have any information to impart to the shareholders, or any recent advice, I shall be glad if you will take this opportunity of doing it. It will be more satisfactory than a mere report to the shareholders, and we shall be glad to have your comments upon it. With regard to the idea started by Mr. Morrison, with regard to the old shares, a great number of absent shareholders thought that the market might be effected by the issue of 1200 or 1700 shares, which would come into competition with the present shares; therefore, it is satisfactory to know that you intend to allot them *pro rata* to the shareholders at such a price as will be a bonus to them.

The CHAIRMAN: No; I said we will leave them in the hands of the shareholders to do as they please with. I did not pledge myself to any course.

Mr. WILLIAM ABBOTT: I understand that; but at the same time it is satisfactory to know that they will not be sold *en bloc*, and come into competition with the present shares. I expected nothing else; and in these days, when rumors are circulated with such audacity, it is right we should have an assurance from those who are perfectly safe in your hands. Now, with respect to these old shares, I have every respect for those persons who hold them; but they did not come forward and pay up their calls when there was any doubt about the value of their shares, but now that these shares are considerably increasing in value those gentlemen come forward to establish their claims and pay up their calls. Therefore, I throw it out for your consideration whether the time should be extended beyond the next meeting, and whether, after next meeting, those gentlemen should not be shut out of the benefit. There is a limit to these things. Supposing the shares were 20, it would be more satisfactory to come forward and prove the ownership of them if they were at that price. We shall be glad if you will give us the latest information received from the mine.

The CHAIRMAN: It will be competent for the shareholders at the next meeting to pass any resolution they like regarding those shares.

Mr. WILLIAM ABBOTT: It is generally the fiat of the solicitor of the company that it is not competent to pass a resolution, in fact, the shareholders are a general powers at a meeting called for a special purpose. Therefore, I throw out the suggestion that you should put an end to the option of conversion at the next meeting.

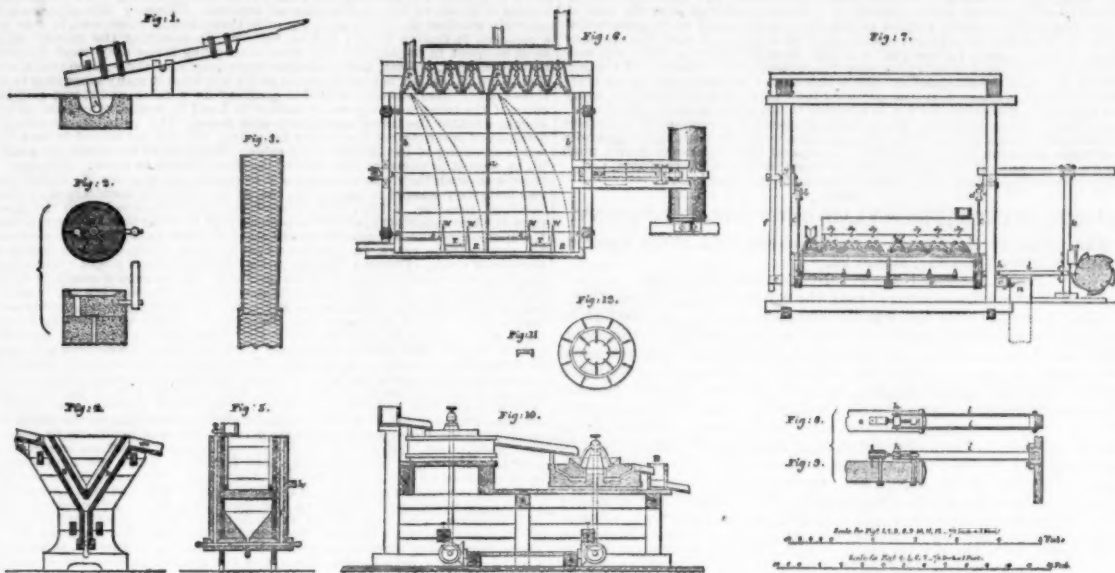
The CHAIRMAN: The "option" is really over; it is only on sufferance; but it is rather hard on families who have overlooked the property for many years, and up to this point we receive their demands.

Mr. WILLIAM ABBOTT: That is quite right.—The CHAIRMAN: The hard and fast date is over.

Mr. BROWNE (secretary) said that one difficulty had been that the directors did not know the addresses of many of those old shareholders, and the notices had come back through the Dead Letter Office. Up to Feb 28 about 400 had made application, and these were in course of arrangement. There would never be any application for the great portion of the others.

The CHAIRMAN, with respect to the report of Mr. Hay, and a letter from Mr. Rocha, which, in the course of half-an-hour, was placed upon the table, and sent to the Stock Exchange. I think I may state with truth that, so far as regards the news it contains respecting the condition of the mine, it is the most satisfactory report we have ever had. (Loud cheers.) Everything is going on well. The large hoisting crab had been placed in a certain position in the mine. As to the net output of \$5000 for the week ended Feb. 23, which we had by tele-

MINING AND THE TREATMENT OF GOLD ORES IN THE NORTH OF JAPAN.



MINING AND THE TREATMENT OF GOLD ORES IN THE NORTH OF JAPAN.

BY ROBERT JAMES FRECHVILLE, ASSOC. M. INST. C.E., H.M. INSPECTOR OF MINES FOR CORNWALL AND DEVON.

In the northern part of Hondu, the largest of the Japanese Islands, about midway between the eastern and western seaboard, and some 60 miles to the south of Awomori Bay, are situated the Okudzu Mines, where a number of small veins enclosed in a porphyritic rock have been worked for gold from time immemorial. (This memoir is published in the Other Selected Papers, edited by Mr. JAMES FORREST, the secretary of the Institution of Civil Engineers, by permission of the Council). These veins vary in width from 2 in. or 3 in. to as many feet, the average width being about 1 ft., and are filled with quartz and decomposed country rock carrying disseminated crystals, and thin bands of copper and iron pyrites, together with small quantities of zinc blende and galena. The gold contained, which is in such a finely divided state that without pulverising and washing the ore it can scarcely ever be detected in the richest specimens, even with the aid of a magnifying glass, ranges from a mere trace up to several ounces per ton. The richest classes of ore also often have telluride of gold associated with them.

The district being mountainous has enabled these veins to be worked by means of adit levels to a depth of about 120 fathoms below their outcrop. In driving these adits, the deepest of which has a length of over 1400 fathoms, advantage has been taken of a soft clay cross-course, which intersects the lodes, and has heaved them 40 or 50 fathoms; close to this cross-course the lodes were most productive, and have been extensively mined, whilst some little distance off they decreased in size, and became hard and poor. The miners worked both on tribute and tutwork by single-handed drilling with powder as an explosive; safety fuse was also used; the holes bored were about 1 in. in diameter, and 14 in. in depth; light was furnished by torches made of dried bamboo twigs; all the ore raised was carried to the surface in straw bags by women and girls; and was transported in like manner from the mine to the dressing-floors, situated in a valley about 1½ mile distant on the banks of a small river. The miners earned an equivalent of about 1s. per day, and the ore carriers from 4d. to 6d. per day. About 120 tons of ore of an average grade of 1½ oz. of gold per ton were produced per month, at a cost of about 4½ p. per ton delivered at the floors, the high price being due to the scarcity of this ore remaining above the level of the deep adit, the narrowness of the veins, and the difficulties of underground transportation, caused by the great length of the levels and travelling roads, and their small size, it being just possible in many places to crawl through and no more. A considerable quantity of ore of a grade of about ½ oz. of gold per ton still remained in the mine, but owing to the wretched manner in which it was opened out could not be removed at a profit.

The richest ore was treated by the Japanese gold-washing process, which was entirely carried out by women. The ore was first pounded under stamps resembling a tilt-hammer (Fig. 1), the stamp-head being affixed to the short arm of a lever, while the motive power was given by the foot to the long arm; the coffer consisted of a block of hard stone hollowed out in the centre. When reduced to a coarse powder, the ore was ground together with water under flat stones similar to the ordinary flour-mill, but rotated by the hand (Fig. 2). The sands and slimes produced flowed by means of a spout into a little bowl placed at the head of an inclined plane about 12 ft. long formed of three scored boards, each 4 ft. long, and 1 ft. wide, set at an angle of 12°. These scored boards (Fig. 3) were made by taking a smoothly-planed plank, and marking it with a saw, which was held inclined towards the head of the board at an angle of 60° from the horizontal. The saw-cuts were 1 in. apart and 1-12th in. deep. An additional supply of water flowed into the bowl at the head of the inclined plane, the diluted material passed over the boards, the heavier particles remained in the furrows or saw-cuts, and were removed by washing and knocking the boards in a tank of water; the sands and slimes escaping from the ends of the boards fell into a tub, which retained the coarser portion, whilst the slimes flowed over the edge into the pits, from which they were occasionally shovelled out and reworked. The coarser sands caught in the tub were reground. By this means from 50 to 60 per cent. of the ore treated was changed into slimes. The concentrations from the boards were washed out by hand in a slightly concave wooden dish, about 18 in. square. The gold obtained was melted with borax and lead, and the product cupelled. The rich residues from the hand-washing were reground, and again subjected to concentration on the boards. As can readily be imagined, in spite of the cheap labour, the women receiving only about 3d. (5 sen Japanese) per day, the process was an expensive one, and very limited as to the amount of mineral treated. About 10 tons per month were pulverised and washed as described at a cost of 2½ p. per ton. The results obtained varied according to the grade of the ore, about 50 per cent. of the gold being got by the first washing from ores of 2 ozs. per ton, and about 80 per cent. from the richest class of ores, which assayed at the rate of 5 ozs. per ton and upwards. The tailings, after being exposed for some time to the action of the atmosphere, were reworked, yielding a further amount of gold. From the above it is apparent that in these mines only the richer classes of ores could be mined and washed by the Japanese processes at a profit.

In order to increase the output of the mines, and enable the poorer classes of ores to be utilised, the Japanese Government ordered a 10-stamp gold-mill from San Francisco. This was erected by an American engineer, who unfortunately died just as the works were completed; the author was then instructed to proceed to the mines, and put the mill in operation. He found it to be of the usual Californian pattern, intended for battery and copper-plate amalgamation; the sands and slimes produced by the stamps flowed over 20 ft. in length of amalgamated copper plates, and the tailings through Hendy's concentrators, the produce being amalgamated in two flat-bottomed grinding pans of a capacity of 1000 lbs. of ore each per charge. As the ore contained gold in an excessively finely-

divided state, associated with from 10 to 20 per cent. of sulphurets, this process failed to give satisfactory results, by far the greater portion of the gold escaped amalgamation in the mortars and on the plates, and passed to waste in the finest slimes on which the Hendy's concentrators would not act. The author, therefore, determined to concentrate before amalgamation, and as the first principle in concentrating stamp-work consists in assorting or classifying the sands, he led the pulp (crushed ore with water) from the mortars directly into a slime-separator.

The 10-stamps, each of which revolved automatically and weighed complete 750 lbs., were contained in two mortars, and were driven at a speed of 60 blows per minute, with a 9-in. drop, discharging through iron wire screens with 1600 holes to the square inch. Some difficulty was experienced at first from the choking of the sieves, caused by pieces of bamboo from the torches used in the mine being mixed with the ore; this was effectually prevented by enclosing the sieves on the outside with boards, leaving a space of 3 in. between the boards and screens, the pressure being thus equalised. The bottom of this compartment was inclined from both sides towards the centre. At the lowest point there was an opening adjustable by a slide-gate, by means of which the discharge and the height of water in the mortars was regulated. The stamps crushed from 10 to 12 tons per 24 hours, or a little over 1 ton per stamp. The slime separator "Spitz-Lutte" for classifying the stamped ore depended for its action on the falling of the denser portion of the stuff through an ascending current of clear water, which at the same time carried the slimes upwards and out of the apparatus. It was made by inserting a wedge in a wedge-shaped box (Figs. 4 and 5), leaving a space of 4 in. between it and the inclined sides of the box; in the interior of the box at the bottom two funnel blocks C C were fitted, so that there was an opening 2 in. square connecting with the pipe e, ¾ in. in diameter. Clear water was admitted by the pipe d; the sands and slimes entered at A, passed down the space B, and came within the influence of the ascending column of water; the coarser and heavier grains fell through the funnel, were carried along the pipe e up the pipe f, and discharged through the mouth-piece h, ¾ in. in diameter; whilst the lighter sands and slimes which could not sink through the ascending clear water, were carried up K, and discharged at m. By varying the height of the mouth-piece A, and its diameter, the size of grain and the quantity of the sands separated were to some extent regulated.

The sands, which amounted to about 50 per cent. of the ore stamped, were concentrated on Bittering's double side-blow percussion table, the concentrates being subsequently amalgamated in the pans. Fig. 6 is a plan, and Fig. 7 a front view of the table, 8 ft. square, made of boards planed smooth and divided into two parts, by means of a strip of wood a, similar strips b being placed on the sides. It was suspended by four iron rods c, at an angle of 6°. The inclination could be varied by means of the screws d. A heavy beam of wood e was bolted to the middle of the underside of the frame of the table, projecting some distance beyond it on each side; to one end of this beam was attached the wooden spring f, which could be screwed nearer to the frame g, thus increasing the strength of the stroke, whilst to the other end of the beam was attached the arrangement h for regulating the length of the stroke, shown on a larger scale in Figs. 8 and 9. Motion was imparted to the table by the rods i connected by the perpendicular rod k with the tappet m on which the cams acted. The percussion was produced by the striking of the heavy wooden beam e against the block a. The spring f had a tension of about 180 lbs., the length of stroke was 1½ in., and the number of strokes 120 per minute. The sands from the classifier came on the distributing board at p, and clear water at q. Under the influence of percussion and the flow of water the heavier particles of ore collected in curved lines, and were discharged at r, whilst the lighter gangue followed nearly straight down in the course of the water, passing off the table to waste at s; between these two there was a middle product obtained at t, which was reconcentrated. The movable tongues u regulated the quantity of material in either class, and were secured in their places by means of thumbscrews. One double table treated from 2½ to 3 tons of classified sands per 24 hours, and acted very well.

The lighter sands and slimes separated by the "Spitz-Lutte," and discharged at m, Fig. 4, were conveyed by a launder to 12 Hungarian mills, arranged in two rows of six each, set one above the other, so that the lower row should receive the slimes from the upper. Fig. 10 gives a side view of these mills, one mill being shown partly in section; they were made of wood bound with iron, and were lacquered on the inside, having a depth of 5 in., a diameter at the bottom of 15 in., and at the top of 23 in., inside measurements. The discharge was 3 in. above the bottom. Each mill held 56 lbs. of mercury, or a depth of that metal of ¾ in. round the central cone, and ½ in. round the sides. Between the runner and the surface of the mercury there was a space of ½ in., and a like space between it and the sides of the mill. On the underside of the runner a number of strips or wings of iron, Fig. 11, were arranged radially as shown in Fig. 12, so as just to touch the surface of the mercury and clear the sides of the mill. The runners made from 18 to 22 revolutions per minute; the slimes were carried over the surface of the mercury by the centrifugal action developed, and were finally discharged into the lower mills, and from them into the launder B. At the close of each run the mercury was drawn off and strained, the amalgam obtained being retorted. From the launder B, as no blankets or hides were procurable the slimes passed over strakes 40 feet long, set at an angle of 7½°, covered with scored boards, so arranged that the slimes always flowed over a width of 8 ft. of boards. These boards were each 5 ft. long and 1 ft. wide, the tail of one fitting into the head of the other. The first two rows of head boards were washed every half-hour, the second two rows every hour, and the last four rows every three hours. Although it required a great deal of labour to remove and wash the boards, they acted excellently in saving the fine gold.

The amalgamation of the concentrates from the percussion-tables

and boards, which amounted to about 10 per cent. of the ore stamped, was performed in two flat-bottomed iron grinding-pans, each having a capacity of from 800 to 1000 lbs. of ore per charge, or a little over 1 ton per pan in 24 hours. These pans made from 50 to 60 revolutions per minute, and after being charged with the right amount of water and concentrates the mullers were gradually lowered, and grinding went on for about three hours, steam having meantime been admitted into the pulp, so that its temperature was about 150° Fahrenheit. Quicklime was next added to neutralise any sulphates that might have been produced.

The mullers were then raised ¼ in. from the dies, and about 100 lbs. of mercury added to each pan; amalgamation then went on for four hours, when the contents of the pans were discharged into the settlers for collecting the mercury, and the pans themselves, being thoroughly washed out with clean water, were ready for a fresh charge of concentrates. The slimes from the settler, after passing through agitators, which saved a further amount of mercury, were carefully stored in pits for re-treatment. The amalgam collected was retorted, and the gold melted into bars in the usual manner.

The pan-amalgamation gave over 90 per cent. of the gold contained in the concentrates, and the result of the combined treatment by concentration and amalgamation was an average of 82 per cent. of the gold contained in the ore milled, which had an average assay value of 1½ oz. per ton. Of the gold obtained about one-third was saved by the Hungarian mills, and the remainder by the pan-amalgamation of the concentrates. Samples of the ore and tailings were taken both by day and night, and assayed so as to check and control the working of the mill. The gold which escapes concentration and amalgamation was contained principally by the copper pyrites, which on stamping formed a very finely divided slime that would float on the surface of the water; some gold was also carried away by floured mercury. A horizontal engine, with cylinder 15 in. in diameter, and a stroke of 2½ ft., supplied the power for working the mill, steam being furnished by a 40-horse power multitubular boiler.

The apparatus and machinery were made at the mine by Japanese blacksmiths and carpenters; the mill was also worked entirely by Japanese, who, for intelligence and attention to details, are not to be surpassed by the workmen of any country. As to the cost of milling, the author is unable to give exact figures, it being almost difficult to do so when new works are started, more especially so in this case, where all material, such as castings, mercury, crucibles, &c., had been supplied from the United States, but probably it did not exceed 8s. per ton. In November, 1876, the author returned to Yedo, and the ore which had accumulated during the erection of the mill, having been stamped, and no steps having meantime been taken to properly lay open and develop the mines, they have since proved unable to supply the quantity of ore required by the works. The paper was accompanied by several drawings, from which the above engraving has been prepared.

KNAPPING MOTION STONE BREAKER.

The knapping motion stone breaker, manufactured by Messrs. W. H. BAXTER and Co., of Leeds, having now had several years trial, and having in every case given complete satisfaction, it is not surprising that its merits should have been fully recognised at the Calcutta Exhibition and honoured by the award of a gold medal. Messrs. Baxter and Co. may now be congratulated upon having been awarded the four last medals open for competition for stone breaking machines, and for the information of those engaged in work in which they are employed it may be mentioned that they will also be exhibited at the London International and Universal Exhibition at the Crystal Palace to be opened on April 23. The advantages of what is generally known as a pick-up blow are well known, and Messrs. Baxter may fairly attribute the great success of their machine to the fact that it is this kind of blow which it gives. They explain that the quicker you strike a stone the easier it is broken; that the sooner the driving-shaft is relieved of the pressure it has to exert the greater chance the fly-wheels have to regain their momentum, which decreases the power required from the engine, and that the nearer the toggle levers finish in a straight line the less pressure there will be on the driving-shaft at the finish of the forward stroke of the jaw, and therefore less friction.

It is unnecessary to detail the several modifications which have been introduced in the construction of stone breakers since the introduction of the first Blake machine; but the essential feature in the Baxter machine is that it has a peculiar compound toggle motion, which gives a varying speed to the jaw at different portions of its travel; to move the crank commencing with the forward movement of the jaw, the first quarter of a revolution of the fly-wheel, the jaw moves three-quarters of its forward movement, the second quarter it moves the remaining quarter, the third quarter the jaw returns one quarter of its move, and the completion or last quarter of the revolution it gives the remaining three-quarters of its movement, so that the finish of the backward and the commencement of the forward movement is much quicker at this half the revolution than the other, being as much quicker as three is to one, taking all the machines running at the same speed (although this can be run much faster), the blow in Baxter's machine will be nearly as quick again as in all others, which of necessity must require less power to do a given amount of work, produce a more cubical sample of road metal (owing to the sudden action causing the stone to rebound and change its position in the jaws of the machine), produce less waste in chippings, and when required for fine crushing the irregular movement prevents the material from sticking to the jaws, therefore turns out more material. The movement of the jaw can be regulated to suit any kind of material, and as a soft or tough stone requires a longer stroke than a hard or brittle stone this is of vital importance, as it is very difficult to know what movement is required until you see the material in the machine. Baxter's patent is the only machine which possesses this arrangement, and which any ordinary workman can regulate in a few minutes. From the different character of the work done it is easy to recognise whether it has been operated upon by a Baxter or by another machine, and from the experience of five or six years' working it is found that when once the Baxter system is adopted there is no inclination to revert to those which it replaces.

MODERN PROGRESS IN MINE ENGINEERING—No. V.

BY H. BRAMALL, M. INST. C.E.*

In the economical unwatering of mines no very manifest progress has been made in modern times. Forty or fifty years ago the Cornish pumping engine had been brought to a degree of efficiency and economy which has not been surpassed by any more recent type, but its large first cost and generally ponderous character has led to the introduction of many forms of direct acting engines, cheaper, simpler, and more easy of application if somewhat less economical in subsequent working. Many of these placed underground are now forcing columns of water to vertical heights of as much as 600 and up to 1100 ft., the only encumbrance in the shafts being the steam and water pipes, and as the pumps are double acting and the flow of water practically constant these pipes for a given discharge may be very considerably smaller than would be required for ordinary lift-work. Direct acting engines are either rotary (controlled by a fly-wheel) or non-rotary, and of the latter class the one designed by Mr. Davey, with his beautiful differential valve gear, may be cited as an excellent example. This valve gear has also been applied to control Cornish engines with the best results. As might be expected under such heavy water columns some trouble has been experienced with the valves or clacks, and Mr. Davey has got the best results from a modified form of Harvey and West double beat valve. Direct acting pumps actuated by hydraulic power have been found very useful in draining dip workings, the dispensing with rods and substitution thereof of a simple line of pipes being a very great convenience, and at Clausthal a pair of rotary engines has been erected, driven by

* President's Annual Address to Liverpool Engineering Society.

a hydraulic head of 1959 ft., the pumps being 13 in. diameter and 24 in. stroke, capable of forcing at 12 revolutions per minute 330 gallons to a height of 750 ft., the percentage of useful effect being 35. At lower speeds this duty sinks, and at three revolutions is only 15 per cent., and the cost of the installation was very great. It could only be under very exceptional circumstances that this would be repeated. In Germany, Rittinger's pump with a tubular rod is regarded very favourably, and has of late been extensively adopted. Amongst minor but important details the substitution of wrought-iron for cast in main engine beams may be mentioned, the form given being either rolled slabs as at Clay Cross or built up plate web girders.

In metalliferous mines, and especially in Cornwall where fuel is costly, great attention has always been paid to the construction and setting of boilers, and to contrivances to economise fuel. It is only in recent years, however, that the increasing value of small coal, and perhaps less indifference among managers, have caused these matters to receive the attention at collieries to which they are entitled. And accordingly we find the antiquated egg-ended externally fired boiler has followed in the wake of its predecessors—the "haystack" and "wagon," and has been displaced by the Cornish or Lancashire flued boilers, often with conical tubes and sometimes with mechanical stokers, and where coking is practised the escaping gases instead of being a nuisance in the vicinity are now conducted under the boilers and utilised in the generation of steam. In some cases by the aid of gas producers refuse coal is thus utilised, while boilers, pipes, and cylinders are carefully covered to prevent waste of heat (silicate cotton being about the best material for the purpose), and the warming of the feed water in some manner by otherwise waste heat is very generally practised.

That very difficult problem how safely to light our fiery mines remains unsolved. No very great advance has been made in recent years, and we still await the discovery of a safe safety-lamp. The lamps invented by Davy, Stephenson, and Clanny, nearly 70, and by Mueseler over 40 years ago, none of which are absolutely safe are still in very general use. The simple expedient of placing the Davy in a close shield or tin can has diminished the risk, and the Marsaut improvements have added to the efficiency of the Mueseler. In some collieries it is now the practice to test each lamp before use by contact with or immersion in gas. The electric light is in use for lighting surface operations, such as screening, &c., for which it is well fitted, and it has been tried underground but not with very satisfactory results. As a miner's lamp none of the forms yet proposed are of service. The miner's lamp must be self-contained, no lamp requiring a detached battery or having wires attached is of any use; it must give at least 12 hours sustained light, must be portable and admit of being placed in almost any position to suit the requirements of the moment, and ought not to exceed 3 to 4 lbs. weight in its complete state, and it must not require any but the very slightest attention on the part of the miner to keep it in order during work.

The furnace as a means of producing a current of ventilation is being rapidly superseded by mechanical means. More than three centuries ago fans were in use on a small scale for this purpose, but it is only in recent years that they have been employed of sizes and capabilities commensurate with the magnitude of modern collieries. The several types in common use, with their efficiency, may be classed as follows:—

Type.	Name.	Efficiency.
Closed cased fan.....	Guibal.....	40 to 61 per cent.
" " ".....	Schiele.....	46 to 49 "
Open running fan.....	Waddle.....	53 "
Displacement machines.....	Struvé.....	58 "
" " ".....	Root.....	48 "
" " ".....	Nixon.....	46 "
" " ".....	Cooke.....	37 "
" " ".....	Lemelle.....	23 "
Screw.....	Pelzer.....	?

The best fans are decidedly more economical than furnaces, and even were this not so their greater safety ought to lead to their exclusive adoption in every mine in which there is a possibility of explosive gas ever being met with.

Although in the means of generating a powerful ventilating current we may claim considerable improvement the best methods of distribution are not always practised, and notwithstanding that nearly 80 years have passed away since Buddle introduced the system of splitting the air and district or panel airing we find collieries where the advantages thus to be gained are lost sight of. In steep mines also more attention should be paid to ascensional ventilation.

To ascertain the quantity of air passing through a road it is no longer necessary to guess by the aid of a puff of powder smoke or by carrying a candle with flame kept upright as did our fathers. We possess now very accurate and reliable anemometers which 50 years ago were quite unknown, those of Biram (revolving vanes) and Dickinson (vertical vane) being most convenient and largely used.

In what state does fire-damp exist *in situ*? and what are the effects of varying atmospheric pressure upon its liberation? and is the barometer of any value as a warning of coming danger? These are questions which early attracted attention, and have been much discussed. Mr. Wood has carried out a most extensive series of elaborate

and careful experiments to ascertain the conditions as to the solid coal, and Mr. Corbett has rendered a similar service in respect of gas, and the conclusion seems to be in both cases that the barometer affords no reliable indications when to expect danger from gas in mines.

The influence of coal dust in explosions has been carefully investigated, and though it is not established that dust alone may be the cause of an explosion it is conceded that in a dusty atmosphere the addition of a smaller quantity of fire-damp is requisite to bring it to the explosive point, and that the effects of an explosion may be intensified and extended by the presence of dust, and accordingly in many very dry and fiery mines the main roads are kept regularly watered, or still better by sprinkling salt upon the dust the same object is attained without the liability of causing the floor to heave and swell. Several instruments have been devised for detecting the presence of minute quantities of fire-damp in air, such as those of Forbes, Ansell, and Liveing, but none of them are of any practical use to the operative miner, and they are chiefly interesting as very ingenious scientific toys.

A review of progress would not be complete without some mention of the increased safety with which coal mines are now worked. In 1851 the deaths from accidents of every kind in the coal mines of the United Kingdom were 456 per 1000 people employed, while in the decade ending 1860 the ratio was 4.07, in the decade ending 1870 it was 3.32, and in the decade ending 1880 it was 2.35, and for the two years 1881-2 the ratio is 2.081. Without attempting to go minutely into particulars it may be briefly stated that this marked improvement is entirely in those classes of accidents in the prevention of which improved machinery and appliances, increased knowledge, better discipline, and more competent supervision may be expected to have greatest effect. While on the subject of accidents mention may be made of the Fleuss apparatus, by aid of which the explorers at Seaham Colliery were enabled to penetrate into the workings a distance of 400 yards in an irrespirable atmosphere. In cases of accident causing serious injury, the patient's sufferings have often been intensified by his being jolted to his home in a stiff springless cart, but the labours of the St. John's Ambulance Association have extended a knowledge of how to give first aid, and ambulances or stretchers of a simple kind, by which the pain consequent on removal is much lessened, are now provided at many large mines, and ought to be at all.

CURIOUS PROPERTIES OF COAL GAS.

It is surprising, said Mr. THOMAS FLETCHER, F.C.S., in an interesting lecture delivered at the Gas Exhibition, Cheltenham, on Monday, how little is known concerning the use of gas. Until within the last few years most people have been under the impression that it was merely a means of obtaining light, and even for this purpose it has been, and I may say, still is, most wastefully used. The majority of people seem to think that if they only burn a quantity of gas it matters very little how the gas is burnt, or what burners are used. As an example, I often see ordinary sitting-rooms about the size of my own, 15 ft. by 20 ft., lighted by three or four burners, each being most carefully enclosed withopal or ground glass globes, which waste about half the light. My own sitting-room is lighted by one No. 8 Bray's burner, and I may safely say that few rooms are so well lighted. People are not generally aware that one large burner gives far more light than two separate burners, each consuming 4 ft. per hour, and that one burner without shade is about as good as two withopal or ground glass globes. Many people prefer the appearance of burners with glass globes, but they must bear in mind that this entails a much larger gas consumption for the same light, and also more heat and vitiated air in the rooms. A great argument against the use of gas is the smoking of ceilings, &c., and curiously enough these complaints come strongest from those people who burn their gas carelessly under excessive pressure without control, and under such circumstances that smoke is almost impossible. The liability to true smoke occurs only in places such as open shops, where the flames are blown about very much, or in those places where first-rate burners are used under the best conditions, that is, just verging on the smoking point. The fact is that the supposed smoke is not smoke at all, the discolouration is grey or brown, not black, as it would be with smoke, and is, I think, caused only by the dust in the air being more or less burnt, caught in the ascending current of hot air, and thrown against the ceiling. When the gas is first lighted the ceiling is cold, and the water formed by the combustion of the gas condenses, forming a surface to which dust readily adheres, and if we use any burner, whether oil or gas, in one fixed position, the discolouration above it is exactly the same, depending entirely on the power of the burners used.

Gas can be burnt most efficiently for heating purposes without any flame or visible combustion; in fact, flame is only a sign of incomplete or imperfect combustion, and looking forward to a possibly near future, I believe that all fuels, both solid and gaseous, will be burnt for heating purposes, without any flame. I will show you how deceptive appearances are by making an enormous flame, in which I am burning, probably, at the rate of 100 cubic feet of gas per hour.

This flame is delusion; like an empty bottle it is all outside and very little use. Passing through the thin film of flame on the outer surface it is quite cold inside, and this I will easily prove. If it were large enough, I should not have the slightest objection to walk into the middle of it and remain there; not being large enough for myself, I will protect the stem of this thermometer from the outer film of flame, and put the bulb inside. It will register about 120° Fahr. I will replace the thermometer bulb by a ball of tissue paper, and you see it is unchanged. I will protect part of my hand from the outer film of flame, and pick the paper out with my bare fingers; and, lastly, will place a small paper of gunpowder in the centre of the flame, and let it remain there. Such a flame as this, notwithstanding its apparent fierceness and size, is of little use. If you place a cold vessel in it it makes an abominable smell. It is a mixture of gas and air, but in incorrect proportions, owing to the faulty construction of the burner, and the mixture can only burn on the surface where it comes in contact with the external air. By increasing the air supply to the correct proportion, as you see, the flame is reduced in size, becomes solid to the centre, and explodes the gunpowder. Carrying on my experiment still further, I now use a different burner of a much smaller size, and use air under pressure from a small foot blower, as the burner I have been using would, with an air blast, require about 1000 cubic feet of gas per hour to work it, and I wish to show you, as near as possible, the same quantity of gas being now burnt under different conditions. This burner you now see is only 2½ in. across the surface, yet, with the assistance of a small blower, it may be made to burn perfectly up to 200 cubic ft. or more per hour, sufficient to make steam for a two or three horse-power engine. You can judge of the heat of the flame by the iron wire I put in it, which you see burns almost like paper.

Changing the burner once again I use a large blowpipe, which gives a most intense flame; in fact, the advantage of a blowpipe consists in its burning as much gas as possible in an exceedingly small flame of great intensity. Now, if you will watch me carefully, I will direct the flame on this ball of fine scraps of wrought-iron, a metal which is practically infusible in an ordinary furnace, and without turning off the gas I will pinch the gas supply pipe so as to extinguish the flame. The gas is still there, burning as before, but burning entirely without flame, and as you see the iron melts and runs like water instantly. That there is no flame I will prove to you by putting a slip of paper before the blowpipe, which, as you see, is not burnt or discoloured; that the gas is burning and has not been interfered with I will prove by stopping the blower, and allowing the gas to burn with a flame as at first. I have now taken you from a cold flame, into the centre of which I put my fingers, to an intense heat without any flame, and, as you see, the heat increases as the flame reduces until at its maximum the flame disappears altogether. The combustion of gases appears to be a succession of explosions, either so quick as to be silent to human ears, or so slow as to make, if continued, a musical sound. To enable you all to hear this I shall, as you will no doubt admit, pass the bounds of what may be considered classical music, but I will make these two burners speak in their own natural tones. If they are not as charming as musical instruments they have the one great advantage that a little of it goes a very long way, and you will not desire that my musical performance shall be a long one. The quantity is amply compensated for by the quality, which is certainly not excelled by anything from a donkey to a fog-horn. Bear in mind that the application of gas to music is in its infancy, and there is certainly room for improvement in the future.

CORNISH PUMPING-ENGINES.—The number of pumping-engines reported for February is 13. They have consumed 1406 tons of coal, and lifted 10.1 million tons of water 10 fms. high. The average duty of the whole is, therefore, 48,700,000 lbs. lifted 1 ft. high by the consumption of 112 lbs. of coal. The following engines have exceeded the average duty:—

Engine.	Millions.
Carn Brea—75 in.	49.5
Mellancar—75 in.	50.6
West Basset—Grenville's 70 in.	51.3
West Basset—Thomas's 60 in.	53.5
West When. Seton—Harvey's 85 in.	65.1
West Wheel Seton—Rule's 70 in.	64.0

COPPER, TIN, AND SPELTER.—Messrs. FRY, JAMES, and Co. (March 20) writes:—In copper there has been uninterrupted heaviness throughout the market for the past fortnight, with a decline of 20s. per ton in value of all descriptions excepting manufactured, for which there has been a steady supply of orders. Tin has experienced some sharp fluctuations between 84s. 6d. and 82s. 6d. per ton, the transactions at the lower rates having been the most numerous. Spelter is fairly steady, but participates in the general dullness.

HOLLOWAY'S PILLS AND OINTMENT.—The great variations of temperature, the fogs, and the foul vapours which permeate the atmosphere, try the respiratory channels terribly; hence arise hoarseness, quins, loss of voice, bronchitis, and the whole train and endless variety of throat and chest affections which now prevail. Neglect of these in their early stages is almost criminal, as many a life may be saved through early and prompt treatment by means of Holloway's well-known remedies. This treatment can be readily and easily carried out, and soon disposes of the attack in a most satisfactory manner, by restoring the balance between the circulation and respiration, by lessening the inflammation, abating the febrile symptoms, and by soothing the irritability of the nerves.

The New System for Working Gold and Diamond Alluvials.

THE "BALL PATENT."

9, BUSH LANE, CANNON STREET, LONDON, E.C.

This new system renders River and Placer Marsh Swamps and Plateau Mining the cheapest of all. No head of water required as per Californian Hydraulic System. Only a few tons of water wanted a day.

ABSOLUTELY CLEARS THE LAST PARTICLE ON BED ROCK OR CLAY BOTTOM.

No fall required for dumping tailings. Depths of rivers, floods, and other difficulties entirely surmounted. 600 tons a day raised, dispersed, washed, and dumped per day for 31. a ton by smallest plant, 1200 tons by second size plant at 2d. per ton.

See *Mining Journal*, 19th January and 16th February, 1884, on THE CHEAPEST METHOD OF TREATING AURIFEROUS ALLUVIALS.

NOTICE TO MINING INVESTORS.

In such esteem is the system held that several extraordinary participations in Gold Alluvials are offered simply for the trouble of putting plant on certain concessions and working it.

Syndicate A completed.

WANTED, investors in B Syndicate, composed of 750 Shares of £10.

Profits are so enormous that it is deemed advisable not to publish them, but they will be communicated to bona fide inquiries.

SUBSCRIPTION NOW OPEN.

Apply by letter first, or personally at above address, Mondays and Tuesdays, 11 to 2 P.M.

ALSO AWARDED GOLD MEDAL AT CALCUTTA EXHIBITION.

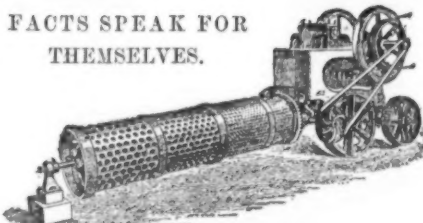
BAXTER'S PATENT KNAPPING STONE BREAKER.



1881.



FACTS SPEAK FOR THEMSELVES.



To Mr. Baxter, Leeds.

Cunderford, Feb. 13, 1883.

DEAR SIR,—I am pleased to be able to tell you that the Machine works splendidly. We are breaking 16 trucks a day now, and we thought it a good day's work to do 10 a day with the old Machine, so you can see the difference. I had a gentleman looking at it yesterday, and he was surprised to see it work so easily. Yours truly, E. ORGAN.

The above refers to one of our 16 by 9 Machines we supplied to replace an "Improved Blake" 15 by 9 Machine. Several of which have already been replaced by Baxter's.

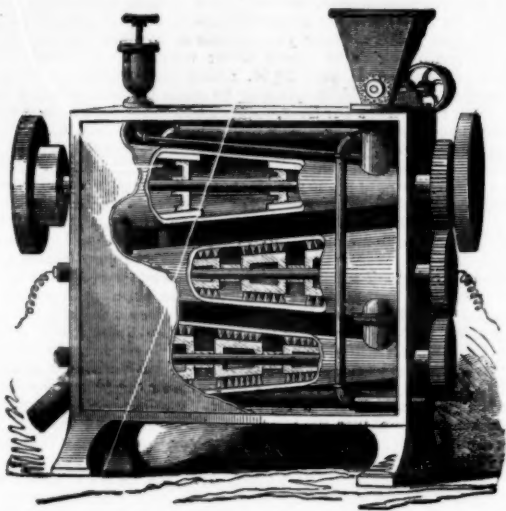
PATENTEES AND SOLE MAKERS,

W. H. BAXTER & CO., ALBION STREET, LEEDS.

NOVEL ELECTRO METALLURGICAL MACHINE.

PROFESSOR JAMES MANES AND SONS call the attention of miners, mineowners, capitalists, and others interested in the working of gold or silver mines to their new Electro Metallurgical Machine for extracting fine and rusty gold from sands or tailings of stamp mills, or the sands of hydraulic gold diggings, or from the black sands on the coast of Oregon or California, and other parts of the world where gold is found.

The problem that has long troubled the worker of free-milling gold and silver ores is a method to save the mineral now lost in the tailings of stamp mills or flumes. This alone, if it could be saved, would amount to many million dollars profit each year, besides enabling the working of much territory which is now lying idle for want of an economical and thorough process of treatment.



Prof. James Manes and Sons, of Denver, Colorado, U.S., have invented a machine (represented in the above engraving) which it is claimed will save nearly the entire amount of mineral which passes through it, the loss not being over 10 per cent., and in many cases not in excess of half that amount. The machine is a cheap and practical process—it never need stop for charging or cleaning up, being nearly self-acting. Steam, electricity, and mercury are used in the process of extracting the mineral.

This machine or amalgamator is adapted for free-milling gold or silver ores, or refractory after roasting. It consists of a series of three or more large cylinders, wider at one end than the other, placed one above the other in a horizontal position, a shaft or spindle running through the centre of each.

The ore and mercury are fed into the first cylinder, passing into the second, and then to the third. The first cylinder is furnished with steel rollers which nearly touch the sides of the cylinder, and revolve at a good rate of speed, mixing the mercury and ore. The second cylinder is furnished with large steel brushes attached to the shaft or spindle, revolving at a high rate of speed; through this a current of electricity is furnished by a Westinghouse dynamic electro machine, which materially assists in gathering the particles of very fine gold together, and thoroughly amalgamating the metal and mercury. The third cylinder is similarly furnished to the second; into this the amalgam passes, and is again acted upon and mixed by the brushes to catch any gold which might have escaped amalgamation in the second. A fourth cylinder may be used if found necessary.

The amalgamated pulp then passes through a revolving copper drum, plated with quicksilver inside. As the drum revolves it takes up the most part of the amalgamated gold. As the inside of the drum is constantly washed with a spray of water from perforated pipes fixed inside of said drum, a clean-plated surface is constantly brought in contact with the pulp or tailings as it passes out from the cylinders. After leaving the drum it falls down on to incline copper plates, the same as is now used in stamp mills.

The amalgam can be collected from the drum and plates without stopping the machine, and any live quicksilver that passes off in syphons. The tailings are carried off with the water. The machine when attached to the flume will be driven by the waste water; it sifts the fine sands from the coarse gravel, and amalgamates it as above.

The specific points claimed by Prof. Manes and Sons in their patent are—

- 1.—The saving of almost all the mineral passing through the machine.
- 2.—The loss being less than 10 per cent.
- 3.—The entire absence of loss of the amalgamated material, thereby saving all the mercury, which, with the processes now in use, there is a large loss both of mercury and the precious metal.
- 4.—The small cost per ton at which the ore can be treated.

By the addition of the powerful current of electricity that passes off the revolving brushes, the most minute particles of gold will be caught and retained, which in the ordinary flume and stamps passes off with the water; this often amounts to a large percentage.

The inventors state that if English stock companies will give their assistance to work the black sands of Oregon and California by paying for the building of the machines, they will take a share of the gold for their services, or they will send their machines to any part of the world, or will sell patent rights to those desiring any of their patent machines or revolving furnaces for roasting or melting ores, ball pulverisers, &c.

Prof. James Manes and Sons are agents for the Morey and Spary Ball Pulveriser, that crushes and pulverises at the same time, and does as much work as eight stamps in a day, crushing either wet or dry.

PRINCIPAL OFFICE OF

Prof. MANES and SONS,

No. 9, Windsor Block, Denver, Colorado, U.S.A.

All our machines and furnaces are made by the Colorado Iron Company of Denver, Colorado, the most extensive mining machine works in America.

W. F. STANLEY

MATHEMATICAL INSTRUMENT MANUFACTURER to H.M.'s GOVERNMENT, COUNCIL OF INDIA, SCIENCE AND ART DEPARTMENT, ADMIRALTY, &c.

MATHEMATICAL, DRAWING AND SURVEYING INSTRUMENTS of every description, of the highest quality and finish, at the most moderate prices.

Price List post free.

ENGINE DIVIDER TO THE TRADE.

ADDRESS—GREAT TURNSTILE, HOLBORN, LONDON, W.C.

FROISSETH'S NEW AND REVISED MAP FOR 1875.—

Size 40 by 56 inches, scale 8 miles to the inch. Handsomely engraved, coloured in counties, showing the Towns, Settlements, Rivers, Lakes, Railroads, Mining Districts, &c., throughout the Territory, and all the Government Surveys to date. Mounted on cloth, £2; half-mounted, £1 12s.; pocket form, £1.

Also, GENERAL MINING MAP OF UTAH, showing twenty-eight of the principal Mining Districts adjacent to Salt Lake City, and location of the most prominent mines. Price, pocket form, 6s.

Also, NEW MAP OF LITTLE AND BIG COTTONWOOD MINING DISTRICTS showing the location of over Four Hundred Mines and Tunnel Sites, together with the Mines Surveyed for United States Patent. Price, sheets, 5s.; pocket form, 6s.

For sale, and supplied by—
TRUBBEN and Co., 57 and 59 Ludgate Hill, London.
S. A. M. FROISSETH, Salt Lake City, Utah, U.S.

MR. P. S. HAMILTON (late Chief Commissioner of Mines for the Province of Nova Scotia), PRACTICAL GEOLOGIST, MINING AGENT, and MINING ENGINEER, HALIFAX, NOVA SCOTIA. PURCHASES and SALES of MINING PROPERTY effected, with careful regard to the interests of clients.

MONEY LENT, at EIGHT, NINE, and TEN PER CENT., on FIRST MORTGAGE of FREEHOLDS for IMPROVEMENTS and STOCKING, said freeholds in the Province of MANITOBA. Address, HARRIS C. JONES, Solicitor, 20, Masonic Hall, Toronto.

THE TUCKINGMILL FOUNDRY COMPANY,

(TUCKINGMILL FOUNDRY AND ROSEWORTHY HAMMER MILLS),

CAMBORNE, CORNWALL,

Engineers, Iron and Brass Founders, &c.



REGISTERED TRADE MARK.

MANUFACTURERS OF EVERY DESCRIPTION OF

REGISTERED TRADE MARK



PUMPING WINDING AND STAMPING ENGINES

ALL KINDS OF

MINING MACHINERY, SHOVELS, AND MINERS' TOOLS;

ALSO OF

BLAKE'S STONE BREAKERS.



ESTIMATES GIVEN UPON INDENTS AND SPECIFICATIONS.

ILLUSTRATED CATALOGUES POST FREE ON APPLICATION

LONDON OFFICE: 85, GRACECHURCH STREET, E.C.

ESTABLISHED 1852.

SYBRY, SEARLS, AND CO.,

MANUFACTURERS OF THE

CELEBRATED MINING STEEL, BRANDED

Cast Steel, Shear, Blister, Spring, Hammer, and Pick Steel.

Special Rock Drill Steel.

Mining Tools, Files, Saws, Hammers, and Picks.

CANNON STEEL WORKS, SHEFFIELD.

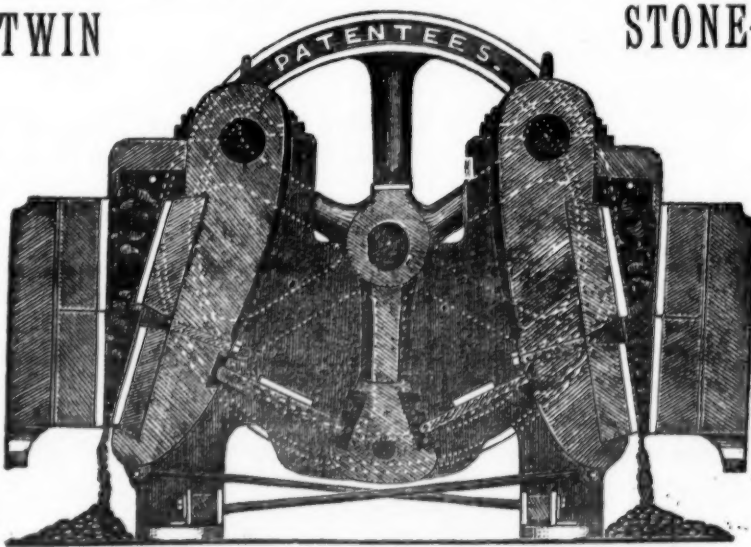
S. MASON & CO.'s New Patent Improved BLAKE'S TWIN STONE-BREAKER.

Leicester.

England.

THE CHAMPION OF THE WORLD.

A few advantages of the Twin Stone and Ore Breaker over all others:—1st. It utilises the waste power known to exist at the back of the single machine.—2nd. It will do twice the work of any other.—3rd. It takes no more power to work it, as the stone at one end helps to break the stone at other.—4th. You can either use one or both ends.—5th. The price is no more than others.



ask for single machines.—6th. It has double cushions in Pitman, so as to break small or large sizes.—7th. You can break, if wanted, small at one end and large at the other.—8th. By putting one toggle plate in top groove of one side of pitman, and the other in bottom of the other side, it gives a rocking movement, so that it cracks the stone and makes it in a more cubical shape than any other in the world.

A single 12 by 7 Stone Breaker, with cracking motion, for £45. Guaranteed to be second to none in the World. Money refunded, if not as represented, one month after delivery, on receiving Machine back.

READ THIS:—

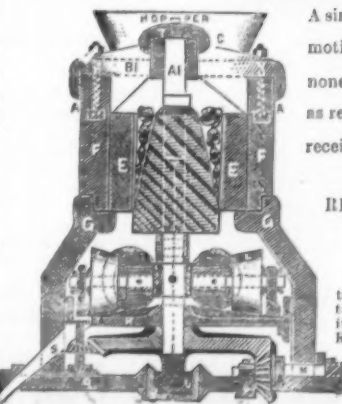
From the Kettering Iron Co. Kettering

GENTLEMEN,—

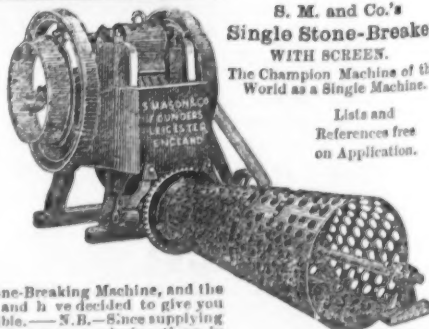
In reply to yours regarding our inspection of Stone-Breaking Machine, and the test with you and Baxter's we think yours the best, and have decided to give you the order. Please get us a 20 by 9 as early as possible.—N.B.—Since supplying it we have received orders for another from the Company, and six others in Kettering and the district.

S. MASON & CO.'S PATENT BREAKER, GRINDER, AND PULVERISER,

All in one operation, either wet or dry material. Send for Lists and Testimonials. Machines made without Pan and Rollers for Kibbling purposes.



This Machine is made to work 100 r.p.m. per min.



S. M. and Co.'s
Single Stone-Breaker
WITH SCREEN.
The Champion Machine of the
World as a Single Machine.

Lists and
References free
on Application.

SEND FOR A PRICE LIST OF JOHN BLAKE'S PATENT SELF-ACTING HYDRAULIC RAMS.

FOR RAISING WATER FOR THE SUPPLY OF
TOWNS, VILLAGES, IRRIGATION, RAILWAYS STATIONS, MANSIONS, FOUNTAINS, AND FARMS.
No Cost for Motive Power, which is obtained from a Stream of Water passing through the Rams.

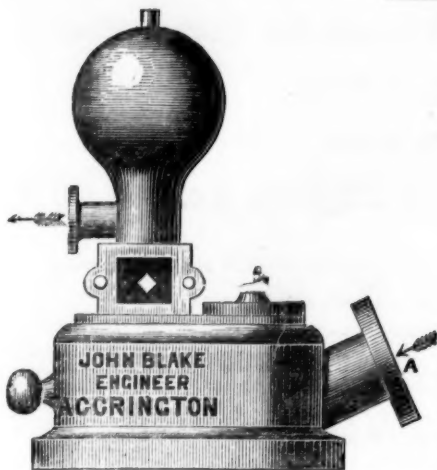


Fig. A.—This Ram raises a portion of the same water that works it, and a special one, on this principle, can be supplied at extra prices to force to a height of 500 ft., and by a second Ram to a height of 950 ft. The patterns vary with the different sizes.

NO OILING OR PACKING REQUIRED.

Made in Sizes to raise 300 to 500,000 Gallons per day.
Will force to a height of 1500 feet.

Special Rams for High Falls to send up Two Gallons out of every Five Gallons passing through them.

** ESTIMATES WILL BE GIVEN ON RECEIPT OF THE FOLLOWING PARTICULARS :
—First, the fall (in feet or inches) which can be obtained from the stream, spring, cistern, or other source of supply; second, the height and distance to which the water has to be forced; third, the approximate quantity falling per minute, and the number of gallons required to be raised in a day of twenty-four hours, and if a B Ram is required, the depth and horizontal distance from the Ram to the clean water should also be stated. Gun metal is liberally used in the construction of these Rams, and the prices include gun metal foot and stop delivery valve, &c. They are fitted up in a most substantial and workmanlike manner, the first cost being only a secondary consideration.

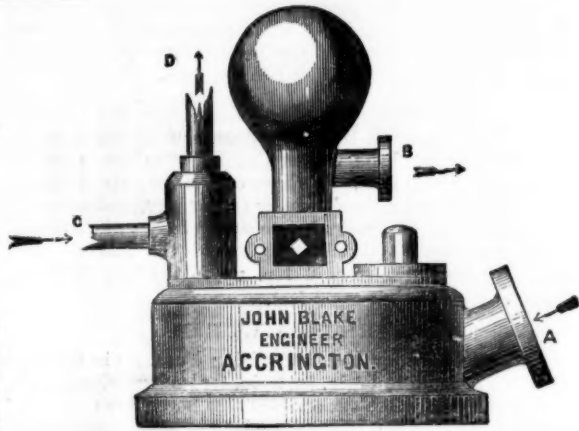


Fig. B.—This Ram whilst worked by a stream of impure water will pump clean water from a well or spring. Rams on this principle can also be supplied to force to a height of 1500 ft. Patterns vary with the different sizes.

PRICES OF RAMS OF FIGURE A MAKE TO FORCE TO MEDIUM HEIGHTS.

No. of the size of the Ram.	Number of Gallons per day of 24 hours, the Ram will raise where there is sufficient working fall as compared to the height the water has to be forced.	Price.
2	300	12 0 0
3	600	15 0 0
4	1,000	18 0 0
5	1,500	21 0 0
6	2,000	25 0 0
7	3,000	30 0 0
8	5,000	35 0 0
9	7,000	40 0 0
10	10,000	48 0 0
11	15,000	58 0 0
12	20,000	70 0 0
13	35,000	100 0 0
14	50,000	140 0 0
15	70,000	210 0 0
16	100,000	250 0 0

SUPPLIED TO

His Royal Highness the Duke of Connaught
His Highness the Maharajah of Kashmir
His Grace the Duke of Cleveland
His Grace the Duke of Portland
The Most Noble the Marquis of Downshire
The Right Hon. the Earl of Crawford and Balcarres
The Right Hon. the Earl of Derby
The Right Hon. the Earl of Rochester
The Right Hon. the Earl of Romney
The Right Hon. the Earl of Granard
The Right Hon. the Earl of Beauchamp
The Right Honourable the Earl of Caledon
The Countess de Morella
The Right Hon. Lord Viscount Galway
The Right Honourable Lord Viscount Bridport
The Right Honourable Lord Viscount Clifden
The Right Honourable Lord Leconfield
The Right Hon. Lord Ribblesdale
The Right Honourable Lord Hatherton
The Right Hon. Lord Leigh
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Gen. Gerard Potter Eaton, *The Pole, Cheshire*
Sir Henry A. Hoare, *Bart.*, *Stourhead, Bath*
Sir William Fielding, *Bart.*, *Penicowies, Blackburn*
Sir Robert Menzies, *Bart.*, *of Menzies*
Sir Humphrey De Trafford, *Bart.*, *Trafford Park, Manchester*
Sir Michael Robert Shaw-Stewart, *Bart.*
Sir Henry W. Ripley, *Bart.*, *Acacia, near Leeds*
Sir Michael Arthur Bas, *Bart.*, *M.P.*, *Burton-on-Trent*
Sir W. C. Worsley, *Bart.*, *Hovingham Hall, Yorks.*
Sir Kenneth Smith Mackenzie, *Bart.*
Sir William Eden, *Bart.*, *Windstone, Ferry Hill*
Sir A. Woodiwas, *The Pastures, Derby*
Colonel Starkie, *Lovely Hall, Blackburn*
Colonel Milligan, *Cauldwell Hall, Burton-on-Trent*
Colonel Towneley, *Towneley, Lancashire*
Colonel Hargreaves, *Maiden Erleigh, Berkshire*
Colonel Tremayne, *M.P.*, *Carlewe, Cornwall*
Colonel Mitford, *Mitford Castle, Northumberland*
Colonel Leyland, *Nantelwyd Hall, Ruthin*
Colonel France-Hayhurst, *Davenham Hall, Northwich*
Colonel R. B. Jackson, *Lostock Hall, Lancashire*
Colonel J. E. Foster, *Sanson Seal, Berwick-on-Tweed*
Major J. F. Trist, *Tristford, Totnes*
Major Hardman, *Rawtenstall, near Manchester*
W. Bromley-Davenport, *Esq.*, *M.P.*, *Capesthorpe, Cheshire*
V. P. Bennett-St-nford, *Esq.*, *M.P.*, *Fyt House, Wilts.*
C. F. H. Bolekow, *Esq.*, *Marton Hall, Middlesborough*

TESTIMONIALS.

From Mr. A. J. Rutherford, Agent to C. F. H. Bolekow, Estate Office, Marton Hall, Middlesborough, 26th September, 1883.
"Dear Sir,—I am glad to say that the Rams you put down on the Hambleton Estate for Mr. C. F. H. Bolekow, are working very well. You undertook, with 16 gallons per minute, to send up 1500 gallons a day, and with enough water to work the Rams at full power, 2000 gallons a day. With a supply of 11½ gallons per minute they are lifting 2200 gallons, and when working full power, 3100 gallons per day are sent up to a height of nearly 400 ft. They made a clear start, and have gone well since."
The Delivery Pipe, in the above case, is 9000 ft. in length.

From Mr. Henry Robinson, Engineer to the Stockport District Waterworks Company, September 8, 1883.
"Dear Sir,—I can now report well of the two Hydraulic Rams we have fixed to your instructions for the supply of Disley Village. 40,000 gallons per day was the quantity you promised they would force to a height of 88 ft., but on testing them I am convinced that 50,000 gallons is not the limit of their power, whilst the quantity of waste water used in driving them is not equal to half the capacity of the 6-in. pipe by which they are fed, and I am inclined to the belief that a more simple and efficient pump cannot be found."

From Horatio R. B. Peile, Esq., Commissioner to Sir Michael Shaw Stewart, Bart., Mansion House, Greenock, 13th August, 1883.
"I am glad to say the Ram you fixed at Castle Farm in November last for Sir Michael Robert Shaw Stewart, Bart., continues a great success. The smallness of the driving water—2½ gallons per minute—is not more wonderful than the large proportion of water it sends up—viz., 720 gallons per day, through about 400 yards of delivery pipe, to an elevation of 75 ft."

From Messrs. Austin and Johnson, Architects, 3, Arcade, Pilgrim Street, Newcastle-on-Tyne, 20th September, 1883.
"The five Patent Hydraulic Rams—with about 2½ miles of Delivery Pipes—we employed you to fix on the Callaley Castle Estate, for Alexander Henry Browne, Esq., are so far very satisfactory, particularly when the small quantity of driving water, and the height and distance to which it is forced, are considered. The result is certainly all that you promised."

From Captain Townshend, Wincham, Feb. 10th, 1877.
"In answer to your enquiry, I am glad to say the Hydraulic Ram you sent me in November, 1875, is working exceeding well, and gives no trouble. It will work when quite immersed, as it has been several times during this winter, forcing up water through a delivery pipe 900 yards long at the rate of 80,000 gallons per day, although you only promised 50,000."

From J. Spender Clay, Esq., Ford Manor, Lingfield, Surrey, August 9th, 1880.
"In reply to your letter of enquiry, I am glad to say that the two Hydraulic Rams which you fixed here are working satisfactorily, and that out of 13 gallons 3 quarts per minute, the maximum yield of the spring, they deliver to the top of my house, distant a full mile from the spring, 4 gallons 1 quart per minute, or 6120 gallons per 24 hours, being 120 gallons above the quantity you guaranteed."

From Mr. John Archbold, Engineer to Messrs. Barber, Walker, and Co., Eastwood, Notts, October 21st, 1882.
"I am glad to inform you that the Hydraulic Ram you fixed for Thomas Barber, Esq., whilst working with a fall of 30 ft., and forcing to a height of 90 ft., through 200 yards of delivery pipe, is working exceeding well, throwing up 9 pints out of every 35 pints passing through it, thus giving 77 per cent. of useful effect."

From Mr. T. Barham Foster, C.E., 23, John Dalton Street, Manchester, 12th October, 1883.
"Dear Sir,—I have tested the Ram you contracted to fix on the Hints Estate, Staffordshire, for James Chadwick, Esq., to force 10,000 gallons per day of spring water through 800 yards of delivery pipe, to an elevation of 208 ft., whilst worked by river water falling 5 ft. 9 in., and am pleased to find that when at full power the Ram sends up 13,500 gallons per day to the height and distance named, and though the ram is now adjusted to work at only three-fourths its power, the work done represents over 57 per cent. of useful effect."

From Fred J. Turner, Esq., Agent to His Grace the Duke of Portland, Mansfield Woodhouse, August 30th, 1883.
"Dear Sir,—I have much pleasure in stating that the Hydraulic Rams which you erected last year for His Grace the Duke of Portland, at Lyndhurst, near Mansfield, and at Skeldon, Ayrshire, are working very well, and they are most satisfactory in every way."

From Mr. E. W. Streeter, F.R.G.S., Diamond Merchant, Bond Street, London, and Sackville Park, Sussex, October 1st, 1883.
"Dear Sir,—When you surveyed the site at Sackville Place, Buxted, for the purpose of fixing a Ram with one mile of collecting and distributing mains, I was surprised and pleased when you named the quantity of water you could send up from the resources available.
"My bailiff prepared the ground to your instructions, and in 12 days from the arrival of your men, the Ram was in operation, sending up 20 per cent. more water than you promised to a height of 110 ft., and distributing a supply to a farm and several cottages on the way.
"I have pleasure in recording my entire approval of the work."

From J. R. Shaw, Esq., Arrowe Park, Cheshire, August 31st, 1883.
"I have much pleasure in testifying to the excellence of the two Rams you fixed here. One forces 7000 gallons per day of turbid water, and the other 4000 gallons per day of spring water, through more than 1000 yards of delivery pipe, to an elevation of 110 ft., and the working of the Rams is as satisfactory as the workmanship is creditable."

From Sir A. Woodiwas, The Pastures, Derby, January 15th, 1883.
"Dear Sir,—In reply to your enquiry, I have much pleasure in informing you that the Hydraulic Ram you supplied and fixed for me in July last, is working as satisfactorily as could be wished, and has fully realised my expectations, and I have no hesitation in saying it is a decided success."

From Sir Robert Menzies, Bart., of Menzies, Rannoch Lodge, Rannoch, August 20th, 1880.
"The Hydraulic Ram which you fixed for me to supply water to Rannoch Lodge and Camesurich, two houses ¾ of a mile apart, is a complete success. The extreme distance the water is carried is 1½ mile, and it is raised fully 100 ft., and though the elevations of the two houses are different, there is a regular supply of 7 quarts per minute to each house, which has never ceased since the Ram was set going about three months ago. Your Ram took the place of one previously tried on the same spot, and which did not succeed, and was in fact a complete failure."

From Mr. William Lait, Architect and County Surveyor, Compton Verney, Warwick, 16th January, 1882.
"I have much pleasure in stating that the Patent Hydraulic Ram I had from you for the Rev. J. Cardwell Gardner, of the Vicarage, Butler's Marston, and which you fixed there, is I consider remarkably successful, as indicated below.
"4120 gallons of water per day are passing through the Ram with a descent of 13 ft. 8 in. Out of this small quantity 1080 gallons are sent up to a height of 41 ft., showing 78 per cent. of useful effect, and the noise of its working is so slight as to be almost inaudible."

PRICES OF DOUBLE-ACTING RAMS OF FIGURE B MAKE TO FORCE TO MEDIUM HEIGHTS.

No. of the size of the Ram.	Number of Gallons per day of 24 hours, the Ram will raise where there is sufficient working fall as compared to the height the water has to be forced.	Price.
2	300	30 0 0
3	600	40 0 0
4	1,000	50 0 0
5	2,000	60 0 0
6	4,000	90 0 0
7	7,000	120 0 0
8	10,000	150 0 0
9	15,000	180 0 0
10	20,000	200 0 0
11	30,000	250 0 0
12	50,000	400 0 0
13	70,000	600 0 0
14	100,000	600 0 0

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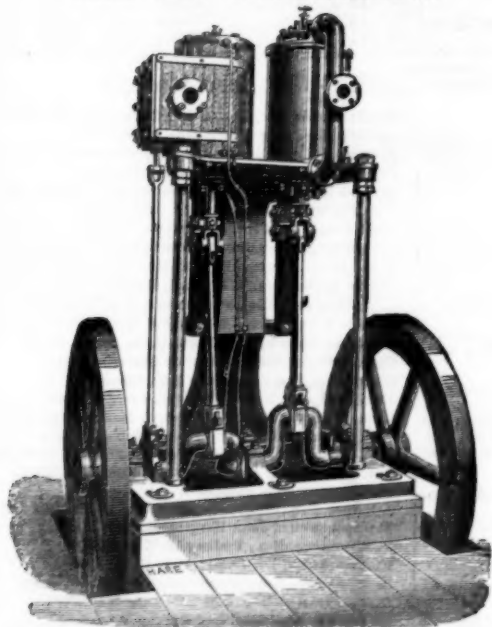
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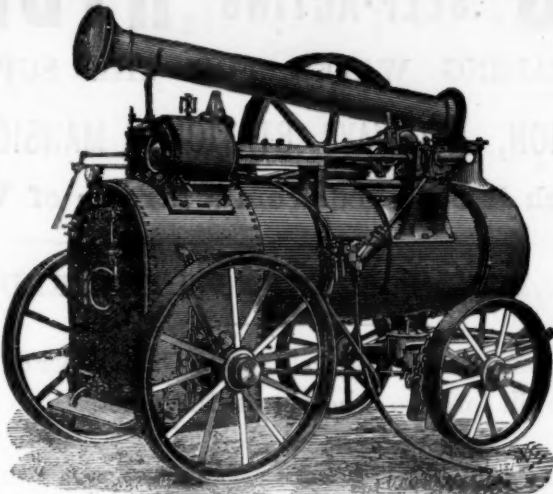
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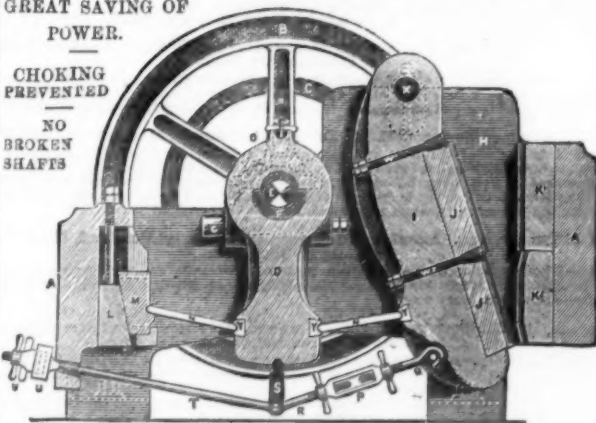
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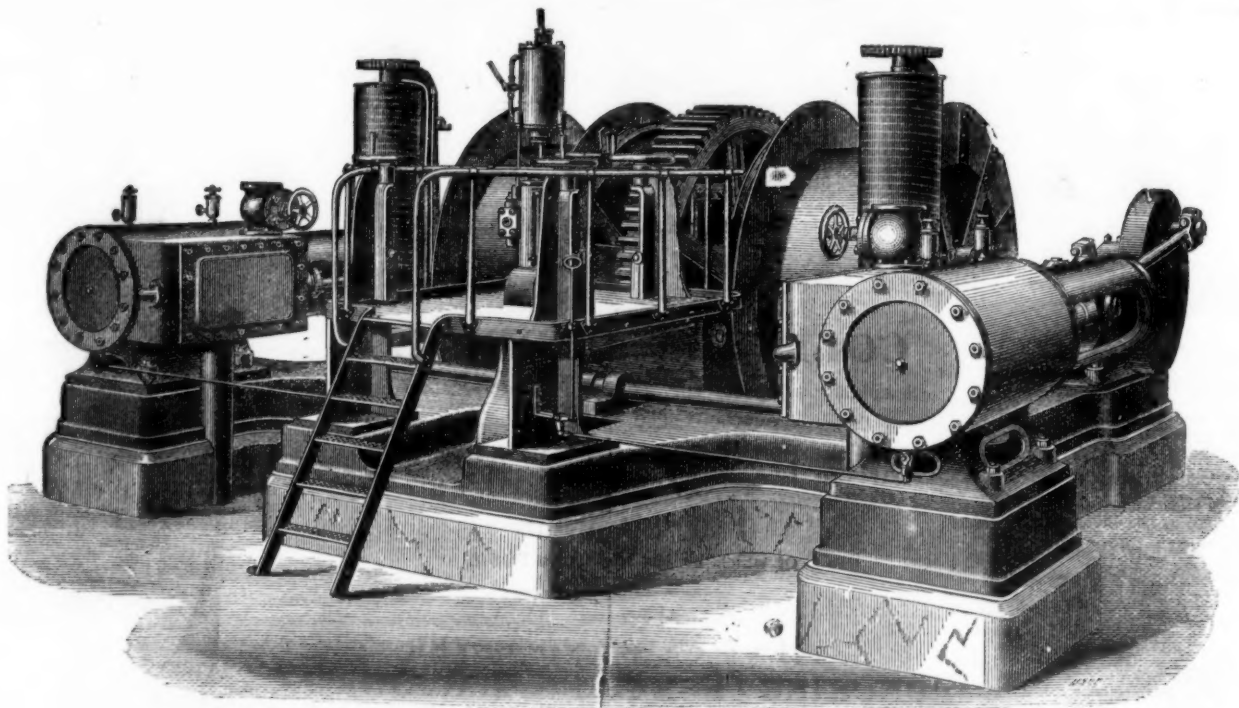
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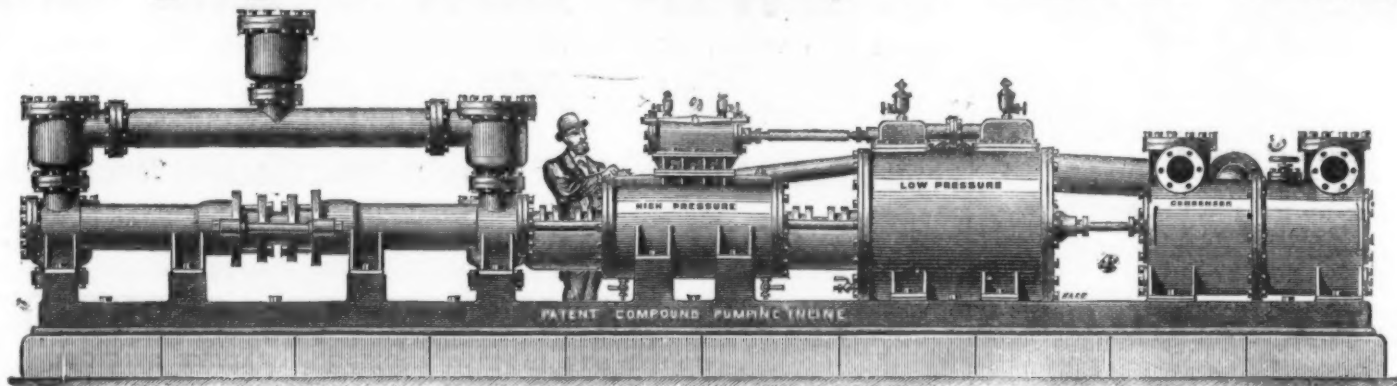
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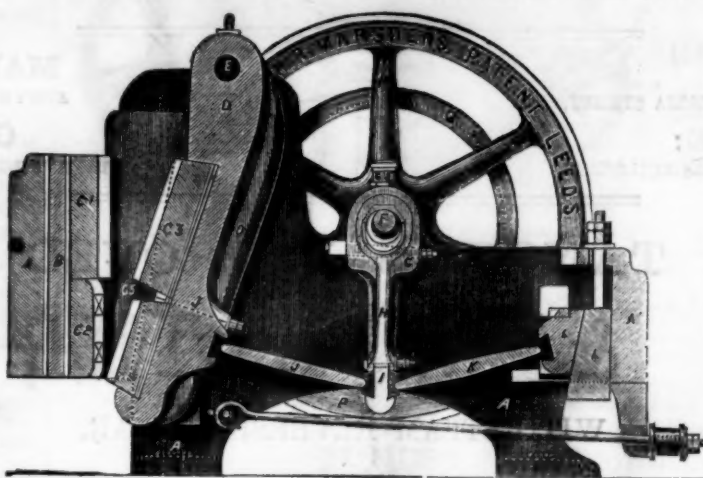
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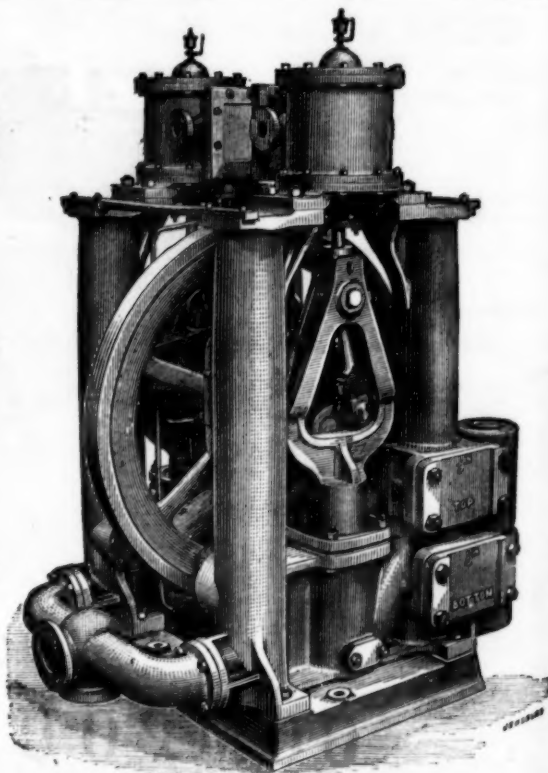
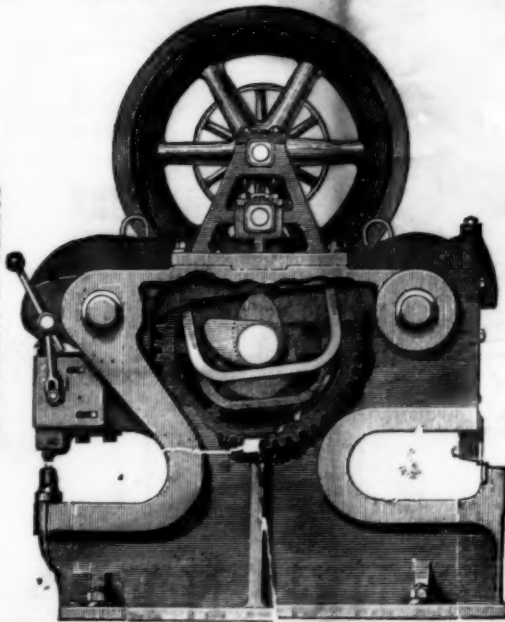
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